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SURGERY OF THE SPLEEN [1]

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WE have acquired a fairly exact knowledge of the function of all the organs contained in the abdomen with the exception of the liver and the spleen, two organs which are closely associated in their physiology and pathology.

The liver is essential to life. One of its chief functions is to receive the products of gastro-intestinal absorption and change them into tissue-building material.

The spleen is not essential to life. It performs for the general circulation a function somewhat analogous to the digestive organs, removing from the blood broken-down corpuscles and other material of probable nutritive value, which is sent as part of the portal circulation to the liver for further elaboration. It is also concerned in the metabolism of iron.

In its ontogeny, the spleen possibly goes back to a time before the development of the cerebrospinal nervous system. This is indicated by the fact that its only known nerve supply consists of filaments derived from the splanchnic sympathetic to the capsule, stimulation of which causes contraction. It is an organ of internal secretion controlled by chemical stimulation through the bloodstream, in many respects resembling the liver. We may surmise that this form of stimulation has been quite adequate for function, otherwise the spleen would be more closely associated with the sympathetic ganglia, as are the adrenals, the hypophysis, and other bodies of internal secretion. The internal secretions of the adrenals and hypophysis produce their effect not only by chemical stimulation through the blood, but also by direct action on the sympathetic ganglia, which enables a very small amount of secretion to produce widespread results. Evidently the internal secretion of the spleen is not important, since splenectomy does not produce serious results, the associated organs taking up the function.

The liver destroys poisons, both chemical and bacterial, and stands as a gigantic defense of the general circulation. Bacteria picked up in the portal circulation are destroyed in the liver, and, according to Adami (1), pigmented areas in the liver are derived from the pigment of slaughtered bacteria. Processes in the liver which interfere with function are often accompanied by changes in the size and parenchyma of the spleen, such as the hypertrophied spleen which so often accompanies cirrhosis of the liver; while primary splenic enlargements are sometimes accompanied by secondary cirrhosis of the liver, as is seen in the late stages of splenic anæmia (Banti's disease). It is probable that cirrhosis of the liver is caused by poisons sifted from the general circulation by the spleen, or by poisons from the digestive tract carried by means of the portal circulation to the liver.

The celiac axis supplies the blood to the stomach, pancreas, liver, and spleen, showing the primitive association of function, just as the superior mesenteric artery outlines the intestinal tract derived from the midgut and

[1] Read before The Clinical Congress of Surgeons of North America, November 11, 1912.

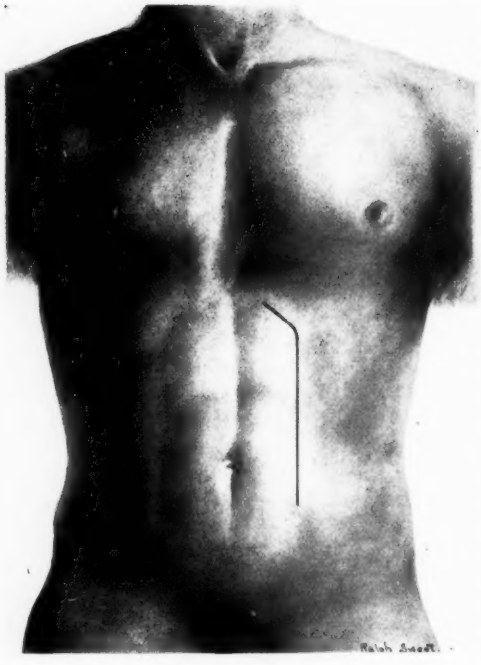

Fig. 1.

the inferior mesenteric artery outlines the greater part of the alimentary canal derived from the hindgut. All of the venous return from the celiac axis, superior mesenteric, and inferior mesenteric vessels unite to form the portal circulation.

During the early months of fœtal life, the spleen, the liver and the bone marrow, as well as the lymphoid and adenoid tissues of the body, are all concerned in the formation of blood. This primitive function of the liver is lost at an early period, but is continued in the spleen to some extent throughout life.

The spleen is found in all red-blooded vertebrates, and is peculiar in that the blood comes in actual contact with the parenchyma of the organ. In the fœtus it appears to have the power of producing both red and white corpuscles. After birth the function of producing red blood corpuscles is probably lost, although the ability to produce white blood corpuscles is maintained. Not only is the function of producing red blood corpuscles lost in the spleen at this time, but it assumes the function of a destroyer of the obsolete red blood corpuscles. The great size of the splenic artery permits all of the blood of the body to pass rapidly through the spleen, which quickly strains out the broken-down cellular elements as well as bacteria and other micro-organisms. The spleen does not appear to have the power to destroy the micro-organisms it captures, therefore the organisms are delivered for destruction to the liver through the portal circulation.

In the perversion of this dual function most of the diseases common to the spleen have their origin. A great overproduction of white blood corpuscles, associated with an enlarged spleen, constitutes leukæmia of the splenic type. An excess of function in the destruction of the red blood corpuscles produces not only hyperplasia of the spleen but an attending anæmia from which splenic anæmia takes its name. The enlarged spleen, (ague cake of malaria) must be considered a conservative hyperplasia in its inception, although in the later stages it becomes the habitat of malarial organisms which it appears unable to destroy or to deliver to the liver for destruction.

With the present inefficient methods of diagnosis, a diseased spleen is not often accurately mapped out until its size is made manifest on palpation beyond the free border of the ribs. The deep situation of the spleen and its relation to the stomach, colon, and intestine, as well as the left thorax, renders accurate outlining before this time open to question; and the fact remains that in the large majority of cases we have no correct knowledge of the actual condition of the spleen until it can be felt at the border of the left hypochondrium.

SPLENIC ENLARGEMENTS

Myelogenous leukæmia. Enlargement of the spleen with an excess of white corpuscles is a characteristic of myelogenous leukæmia, and the microscopic examination of the blood shows a definite picture which is essential to a diagnosis.

The blood of the most primitive animals is white; in a higher stage of development red

blood corpuscles are found, but they are developed from the white corpuscles. The earliest blood found in the fœtus is white, and at this period of development the liver, spleen, lymphoid and adenoid structures of the body, and the bone marrow are blood-producing organs. Leukæmia appears to be a reversion to the embryonic type of blood, in which all of the original blood-making organs have to do with the overproduction of the white cells, just as carcinoma is due to the unlimited production of embryonic epithelial cells, and sarcoma is due to the unlimited production of embryonic connective tissue cells.

The leukæmic spleen has been removed a number of times, and in practically all of the cases in which the diagnosis was established the patient died promptly as the result of the operation. Even if this were not the case, since the leukæmic spleen is but a part of the general condition, splenectomy would be unavailing.

Splenic anæmia. This condition is probably a definite entity. Banti (2), Osler (3), and later Armstrong (4), describe it as a progressive disease characterized by an enlarged spleen, by a reduction in the number and value of the red blood corpuscles and low hæmoglobin, and often by a reduction in the number of white blood corpuscles. Clinically this disease may be accompanied by hæmorrhages, especially from the stomach, by progressive weakness, and often by pigmentation of the skin and chronic jaundice. Banti's disease is simply a late phase of splenic anæmia. It is marked by splenic hypertrophy, with cirrhosis of the liver, occasionally jaundice, and often ascites.

The condition of the blood in splenic anæmia is interesting. As a rule, the red blood corpuscles drop under 4,000,000, often to 3,000,000, and the hæmoglobin to the vicinity of 40 per cent. The white corpuscles vary from 3,500 to normal. The differential count is usually unchanged. After the removal of the spleen the blood picture becomes more nearly normal, although as a rule for some months there are variations at different times. When this particular grade of secondary anæmia exists in connection with an enlarged spleen and the cardinal symptoms previously mentioned, a diagnosis of splenic anæmia can be established, not upon one sign or symptom, but upon the complete clinical picture; and if the disease be uncomplicated, splenectomy may be expected to cure the patient. We have removed the spleen in eighteen cases of splenic anæmia with gratifying results.

Perisplenitis may exist to such an extent in association with splenic anæmia that the spleen cannot be removed without enormous risk to life. Hepatic cirrhosis with perihepatitis may also be present in these cases, the liver and spleen often being encapsulated to a remarkable degree. Because of such complications, splenectomy was abandoned in one of our cases. It is sometimes difficult to determine whether an enlarged spleen with cirrhosis of the liver is a Banti's disease primarily, or whether the splenic hyperplasia is the result of a primary cirrhosis of the liver.

Following splenectomy, there was pain for a time in the long bones in about 25 per cent of our cases, and in one or two cases a temporary enlargement of the lymphatics, evidently a compensatory hypertrophy of the bone marrow and glands, as has been noted by Warthin (5).

There is a type of enlarged spleen of unknown causation not accompanied by anæmia, an essential hyperplasia. I have personally observed two cases in which the enlarged spleen had existed, in one case eight years, in the other six, with the patients in fair health.

Conservative splenic enlargements. The biologic study of micro-organisms found in the blood is interesting. Bacteria such as tubercle bacilli, bacillus typhosis, pus-producing organisms, etc., are vegetable parasites and are more resistent to chemical poisons, such as bichloride of mercury, etc., than their animal host; therefore bactericides usually fail to destroy them. Methods of treatment based upon increasing bodily resistance through the development of opsonins give the best results in diseases caused by these vegtable parasites. Animal parasites or protozoa, on the contrary, are destroyed by specific poisons, such as quinine for the plasmodium of malaria, mercury for the spirochetes of syphilis, etc. Both vegetable and

Fig. 2.

animal parasites may cause enlargements of the spleen, and in such cases the infectious organisms will be found in the spleen in large numbers. In a few cases of tuberculosis, when the infection was apparently primary and limited to the spleen, the spleen has been removed with cure of the patient. One case of primary tuberculosis of the spleen came under our observation at St. Mary's Hospital and was operated on. Franke (6) has collected 29 cases of tuberculosis of the spleen, 10 of which were operated on, with 7 cures.

In chronic malaria with hyperplasia of the spleen, Jonnesco (7) and various other surgeons have removed the spleen a number of times in such cases with gratifying results.

MOVABLE AND WANDERING SPLEENS

A spleen which has developed a complete mesentery, permitting a wide range of motion, is not uncommon, and may be found in the pelvis or passing to the right side of the abdomen. Since such a spleen is subject to more or less traumatism, it sometimes becomes en-

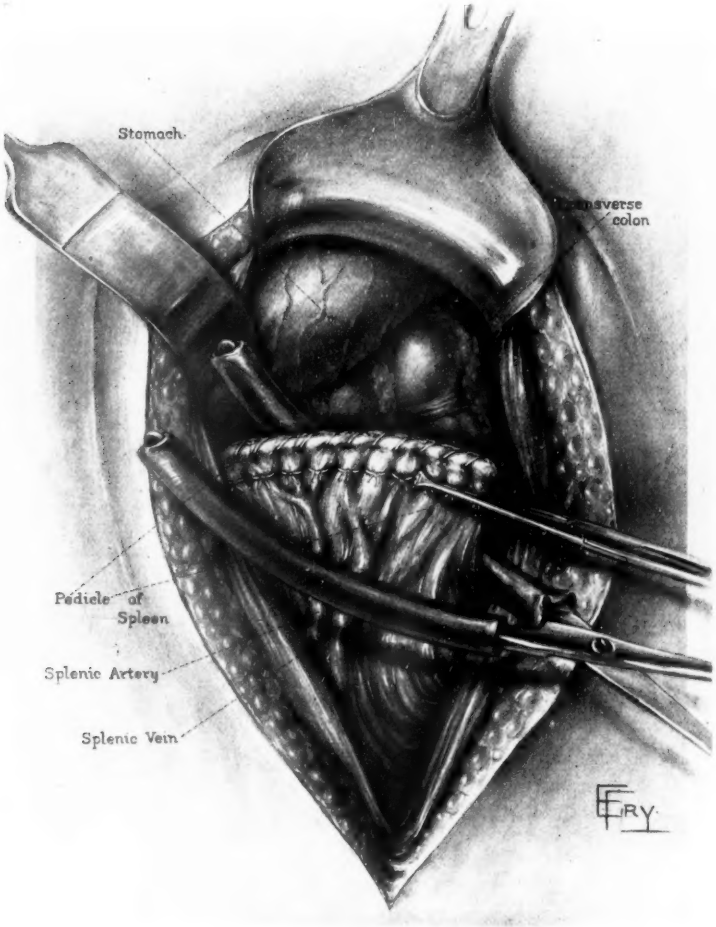

Fig. 3.

larged and appears capable of setting up a marked degree of anæmia. Twisting of the pedicle leads to severe symptoms and is not uncommon in these cases. One patient with a somewhat flaccid abdomen and a movable hypertrophied spleen had learned to control attacks of torsion by proper manœuvres to untwist the spleen. Rotation of the spleen, completely cutting off circulation, has occurred in a number of cases, leading to death or splenectomy.

Several operations have been devised for reducing and holding a movable spleen in a normal position, but, generally speaking, splenectomy is the wiser plan, since in this class of cases splenopexy does not always relieve symptoms and splenectomy is exceptionally easy and safe. We have operated on three cases of symptom-producing movable spleen, one by fixation — a combination of suture and gauze packing. The spleen remained in place, but the patient suffered more or less pain afterward. In two other cases (in one of which the spleen was somewhat atrophied) the organ was removed and complete cures followed.

Fig. 4.

NEW GROWTHS

Cysts of the spleen. The most common form of non-parasitic tumors of the spleen is the cystic spleen, in the great majority of cases primarily due to hæmorrhage within its capsule. I refer those interested in this phase of the subject to an excellent article by Powers (8).

Sarcoma of the spleen. Sarcoma is the type of primary malignant disease of the spleen and is rare. Gaucher (9) described a certain proliferation of the endothelium of the venous sinuses as a neoplasm. The tumor of Gaucher must be considered the same type as that of which Weichselbaum (10), in 1881, reported two cases, calling them primary endotheliomas. Jepson and Albert (11), found 32 such cases, in which splenectomy was made in 10. There were three deaths and four cures in this series, one alive six and one half and one four years after operation. In a critical analysis Fowler (12) reduces the 32 cases to 14, which he believes were true sarcomas and the balance nodular hyperplasias. McConnell (13) throws doubt on this data, believing that the cures occurred in cases of chronic hyperplasia and not in the sarcoma group. Pathologists are divided in their opinion as regards these tumors; some hold that they are sarcomas, and others that they are a type of hyperplasia. Histologically, many of these tumors appear to be neoplasms, but are peculiar in that when they exist primarily in the spleen they are comparatively benign, and if removed early may be cured. One patient with lymphosarcoma of the spleen was operated on in our clinic, November 14, 1905, and is in excellent health to-day. Three cases of the Weichselbaum and Gaucher type of splenic tumor which have been operated on by us were clinically splenic anæmias. Two have remained well since, one dying from the operation.

Splenectomy. It is unfortunate that our main recourse in surgical diseases of the spleen is destructive. As a rule, the disease is advanced before a diagnosis is made, and usually the entire organ is involved, making splenectomy the only rational procedure.

The blood supply of the spleen can be reduced by ligation of some of the secondary arteries in the hilum. Whether this would reduce its function sufficiently to be of practical value I do not know, but it might be tried in some cases in which splenectomy could not be performed. In the somewhat analogous condition of hyperthyroidism, ligation of the thyroid vessels has given remarkable results.

For the removal of a large spleen an incision is made in the outer margin of the left rectus muscle extending from the costal arch downward until there is a space sufficient for manipulation. For smaller spleens a transverse incision is practicable. On opening the abdomen the hand is passed over the spleen under the diaphragm and if adhesions are present, they can usually be broken down with the hand. The spleen can now be brought entirely out of the abdominal incision. The fundus of the stomach and the colon come out with the spleen, and these attachments, together with the lienophrenic ligament, etc., can be tied and divided under inspection. A large gauze pack is carried up into the cavity from which the spleen has been removed temporarily to check the oozing from the separated adhesions. The spleen is then steadied and all of the attachments tied and divided until it remains attached only by its vascular pedicle. A rubber-covered elastic clamp of the Lower variety is placed on the pedicle, if possible about three inches from the spleen. If portions of the stomach or colon are caught with the pedicle by the elastic holding clamps no injury will result. This

hold prevents slipping and sudden hæmorrhage from the great vascular pedicle, and the vessels can be divided close to the spleen into three or four sections and ligated carefully with catgut before the holding clamps are removed.

In hypertrophied spleens of long standing the blood-vessels are often atheromatous, necessitating great care in placing the ligatures. After ligating the vessels, the clamps on the base of the pedicle are loosened gradually, the large gauze pack is removed, and the bleeding points in the deep cavity closed with catgut on a fine needle. In one case I was unable to control the hæmorrhage from the under surface of the diaphragm and was compelled to leave a large gauze pack in the cavity, removing it several days later.

The tail of the pancreas is sometimes drawn up with the pedicle and, unless care be exercised, it may be accidentally tied in the pedicle and divided. I removed one and one-half inches of the tail of the pancreas with the pedicle in one of my cases and did not discover it until I was about to drop the pedicle back. After covering the pancreatic stump with peritoneum, I fastened a one-fourth-inch rubber tube with a split in the end to the pancreatic stump with a fine catgut suture and brought it out of a stab wound. This precaution was, however, unnecessary, there being no pancreatic or other drainage, although the pancreatic duct, where it was cut across, was plainly visible.

Accessory spleens, varying in size from a hazel nut to several inches in diameter, are not infrequently found in the pedicle. If the primary disease be benign, these accessory spleens may be conserved.

The mortality following splenectomy has been estimated to be from 18½ to 27½ per cent. Carstens (14) reports 739 cases, with 137 deaths (18½ per cent). Johnson (15) found a mortality of 27.4 per cent in 708 cases. Under present conditions the mortality is much smaller than these statistics appear to indicate. The operation itself, if the patient be in fair condition, should not have a mortality of above 10 per cent. and probably not above 5 per cent. In our 27 cases there were two operative deaths.

ANALYSIS OF CASES OF SPLENECTOMY

Mayo Clinic, from April 6, 1904, to October 21, 1912

Total splenectomies	27
Total operative deaths	2
Clinical diagnoses:	
Splenic anæmia (5 showing Banti's syndrome)	18
Wandering spleen (recovered)	2
Tuberculosis (died in 4 months)	1
Pernicious anæmia (?) (unimproved 2½ years)	1
Cirrhosis of liver (death within 6 mos., ascites)	1
Infectious (?) splenomegaly	4
Total	27
Operative results in cases of splenic anæmia:	
Operative deaths	2
Well, 1 to 7 years	12
Less than 2½ years	6
2½ years	1
3½ years	1
4 years	2
5½ years	1
7 years	1
Total	12
Improved	2
Death in 3 years; improved until shortly before	1
Death 2½ years after operation, cause unknown	1
Total	18
Pathologic findings in cases of splenic anæmia:	
Lymphoid hyperplasia (Lymphoma (?) 1; Lymphosarcoma 1)	2
Endothelial proliferation (Gaucher type)	3
Chronic diffuse splenitis	13
Total	18

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THE PATHOLOGY OF SPLENOMEGALY: A STUDY OF THE OPERATIVE AND AUTOPSY MATERIAL FROM THE MAYO CLINIC

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MATERIAL STUDIED

THE material for this study consists of the following:

1. Eighteen spleens removed at operation [1] from patients on whom a positive clinical diagnosis of splenic anæmia was made.

2. Six spleens removed at operation [1] from patients on whom a doubtful diagnosis of splenic anæmia was made.

3. Two spleens removed at autopsy from patients on whom doubtful diagnoses of splenic anæmia had been made.

4. Two spleens removed at operation [1] from patients on whom a positive clinical diagnosis of floating spleen was made.

Brief abstracts of the pathological protocols are herewith presented.

ABSTRACTS OF PATHOLOGICAL PROTOCOLS

Case 1. P7074. Female, age 27 yrs. Clin. diagnosis, splenic anæmia. Splenectomy May 17, 1907. Spleen weight, 2190 grams; exterior smooth; tissue highly vascular; lymphoid tissue very greatly increased; no proliferation of endothelium or connective tissue.

Case 2. P3539. Female, age 41 yrs. Clin. diagnosis, splenic anæmia. Splenectomy November 14, 1905. Spleen weight, 3275 grams; smooth, dark red, very soft; cut surface mottled; enormous increase of lymphoid tissue which infiltrates connective tissue bands and vessel walls; some swelling and increase of endothelium; connective tissue only locally increased. Pathological diagnosis, lymphosarcoma.

Case 3. G8869. Female, age 27 yrs. Clin. diagnosis, splenic anæmia. Splenectomy January 7, 1907. Spleen weight, 5280 grams; some perisplenitis; exterior of organ smooth; lymphoid tissue much reduced, remaining islets containing numerous large pigmented cells; most of organ made up of large endothelial cells arranged in groups, surrounded by thin walls of connective tissue, resembling venous sinuses. (Typical "Gaucher" spleen with only slight increase of connective tissue.)

Case 4. A9315. Female, age 37 yrs. Clin. diagnosis, splenic anæmia. Splenectomy May 11, 1908. Spleen weight, 895 grams; exterior rough, hard, mottled; gross section shows marked fibrosis; only a few isolated areas of lymphoid tissue (Malpighian corpuscles); bulk of tissue made up of groups of large endothelial cells surrounded by heavy (contracting) bands of fibrous tissue; numerous giant cells in endothelial groups; accessory spleen shows same histology; primary pathological diagnosis of tuberculosis; corrected by negative results of examination of alcohol-fixed material stained for tubercle bacilli and of three guinea pigs inoculated with fresh spleen at time of operation. Patient well when last heard from two and one half years after operation. (Typical "Gaucher" spleen with great increase of connective tissue).

Case 5. A58571. Female, age 25 yrs. Clin. diagnosis, splenic anæmia. Splenectomy September 26, 1911. Spleen weight, 4500 grams; exterior surface very rough, nodular and hard; cut surface mottled throughout with large and small areas of colloid material; lymphoid tissue has almost disappeared; here and there are groups of large endothelial cells, a few well preserved but most in various stages of degeneration; connective tissue in broad heavy bands surrounding round, oval, or irregular masses of homogeneous colloid material which seems to have been formed by degeneration of large masses of endothelial cells. ("Gaucher" spleen with colloid degeneration). Patient well one year after operation.

Case 6. A10324. Female, age 49 yrs. Clin. diagnosis, splenic anæmia. Splenectomy July 2, 1908. Spleen weight, 1450 grams; exterior slightly roughened; section tough, hard, with marked fibrosis; lymphoid tissue increased; some swelling of endothelium of sinuses; marked increase of connective tissue. Pathological diagnosis, chronic diffuse hyperplasia (chronic splenitis).

Case 7. A18026. Male, age 26 yrs. Clin. diagnosis, splenic anæmia. Splenectomy December 31, 1908. Spleen weight, 425 grams; exterior rough and hard; cut surface hard, fibrous; lymphoid tissue increased; endothelium of venous sinuses swollen; marked connective tissue increase. Pathological diagnosis, chronic diffuse hyperplasia (chronic splenitis).

Case 8. A20818. Male, age 30 yrs. Clin. diagnosis, splenic anæmia (Banti's disease). Splenectomy March 4, 1909. Spleen weight, 1180 grams; exterior slightly roughened and very hard; cut surface firm, with marked fibrosis; lymphoid tissue not increased but confined to isolated areas (Malpighian corpuscles); endothelium swollen and proliferating in venous sinuses and capillaries which are dilated;

[1] The clinical aspects of these 26 cases operated on and also of one case, operated on in 1904, from whom no pathological material is available, will be presented by Dr. H. Z. Giffin in an early number of the *American Journal of the Medical Sciences*, while Dr. W. J. Mayo presents the surgical aspects of the same 27 cases in this number of Surgery, Gynecology and Obstetrics.

connective tissue greatly increased. Pathological diagnosis, chronic diffuse hyperplasia (chronic splenitis).

CASE 9. A22026. Female, age 53 yrs. Clin. diagnosis, splenic anæmia. Splenectomy April 14, 1909. Spleen weight, 1670 grams; exterior rough, hard; cut surface mottled ("sago spleen"), firm and fibrous; lymphoid tissue increased and showing amyloid degeneration in follicles; no material change in endothelium; marked increase of connective tissue. Pathological diagnosis, chronic diffuse hyperplasia with amyloid degeneration (chronic splenitis).

CASE 10. A27414. Male, age 45 yrs. Clin. diagnosis, splenic anæmia. Splenectomy August 11, 1909. Spleen weight, 1514 grams; exterior surface smooth and organ rather soft; cut surface smooth, slightly fibrous, dark colored; lymphoid tissue greatly increased; endothelium swollen; a few giant cells; marked connective tissue overgrowth. Pathological diagnosis, chronic diffuse hyperplasia (chronic splenitis).

CASE 11. A35431. Male, age 39 yrs. Clin. diagnosis, splenic anæmia. Splenectomy May 3, 1910. Spleen weight, 575 grams; exterior rough, mottled, hard; cut surface firm, fibrous, mottled; lymphoid tissue increased and showing some amyloid degeneration in follicles; endothelium swollen in dilated capillaries and venous sinuses; marked fibrosis. Pathological diagnosis, chronic diffuse hyperplasia with amyloid degeneration (chronic splenitis).

CASE 12. A39665. Female, age 50 yrs. Clin. diagnosis, splenic anæmia. Splenectomy July 11, 1910. Spleen weight, 1385 grams; exterior surface smooth and soft; section smooth, mottled, soft, dark colored; lymphoid tissue greatly increased; considerable endothelial proliferation in venous sinuses and dilated capillaries; connective tissue increased. Pathological diagnosis, chronic diffuse splenitis.

CASE 13. A49050. Male, age 23 yrs. Clin. diagnosis, splenic anæmia. Splenectomy February 27, 1911. Spleen weight, 879 grams; exterior rough, hard; cut surface firm, hard, fibrous; lymphoid tissue remaining in Malpighian corpuscles only; endothelium of venous sinuses but slightly affected; marked over-growth of fibrous connective tissue. Pathological diagnosis, chronic diffuse splenitis.

CASE 14. A28194. Female, age 22 yrs. Clin. diagnosis, splenic anæmia (Banti's disease). Splenectomy June 30, 1911. Spleen weight, 1530 grams; exterior smooth, hard; cut surface smooth, firm, dark colored; lymphoid hyperplasia with some small areas of amyloid degeneration in follicles; some proliferation of endothelium in venous sinuses and dilated capillaries; a few giant cells; marked connective tissue overgrowth. Pathological diagnosis, chronic diffuse splenitis.

CASE 15. A58017 Female, age 43 yrs. Clin. diagnosis, splenic anæmia. Splenectomy September 7, 1911. Spleen weight, 610 grams; exterior shows marked perisplenitis; cut surface smooth, hard, firm, with marked fibrosis; lymphoid tissue increased; some swelling of endothelium; marked connective tissue overgrowth. Pathological diagnosis, chronic diffuse splenitis.

CASE 16. A68578. Female, age 56 yrs. Clin. diagnosis, splenic anæmia. Splenectomy June 5, 1912. Spleen weight, 980 grams; exterior smooth; cut surface soft, smooth, dark colored; lymphoid tissue markedly increased; some swelling of endothelium in venous sinuses; a few giant cells; considerable connective tissue increase. Pathological diagnosis, chronic diffuse splenitis.

CASE 17. A68788. Female, age 37 yrs. Clin. diagnosis, splenic anæmia (Banti's disease). Splenectomy June 18, 1912. Spleen weight, 890 grams; exterior rough, hard; cut surface mottled, hard, fibrous; marked hyperplasia of lymphoid tissue; considerable swelling and proliferation of endothelium in dilated venous sinuses and capillaries; marked connective tissue overgrowth. Pathological diagnosis, chronic diffuse splenitis.

CASE 18. A69913. Male, age 49 yrs. Clin. diagnosis, splenic anæmia. Splenectomy July 5, 1912. Spleen weight, 1000 grams; exterior smooth, soft; cut surface smooth, soft, dark colored; lymphoid tissue markedly hyperplastic; some swelling of endothelium of venous sinuses and capillaries which are dilated; marked connective tissue overgrowth. Pathological diagnosis, chronic diffuse splenitis.

CASE 19. A34196. Male, age 55 yrs. Clin. diagnosis, splenic anæmia. Splenectomy February 24, 1910. Spleen weight, 320 grams; exterior smooth, soft; cut surface soft, dark; lymphoid tissue much increased; many polymorphonuclear cells; no endothelial proliferation; no connective tissue increase. Pathological diagnosis, secondary splenic infection.

CASE 20. A59392. Female, age 37 yrs. Clin. diagnosis, widespread upper abdominal infection, acute splenic anæmia. Splenectomy October 30, 1911. Spleen weight, 640 grams; exterior nodular; cut surface smooth with many heavy fibrous bands; lymphoid tissue increased; many areas contain much blood pigment; no apparent proliferation of endothelium; larger bands of connective tissue thickened, but condition not general.

CASE 21. A65749. Male, age 33 yrs. Clin, diagnosis, duodenal ulcer. Splenectomy April 3, 1912. Spleen weight, 900 grams; exterior rough, nodular, hard; cut surface shows dilated vessels, and marked fibrosis; some increase of lymphoid tissue; venous sinuses contracted; no increase of endothelium; marked overgrowth of connective tissue. Pathological diagnosis chronic splenitis.

CASE 22. A14838. Female, age 57 yrs. Clin. diagnosis, Raynaud's disease, gallstones. Splenectomy June 12, 1912. Spleen weight, 1340 grams; exterior rough, hard; cut surface hard, fibrous; lymphoid tissue reduced; no proliferation of endothelium; venous sinuses shrunken; marked overgrowth of connective tissue. Pathological diagnosis, chronic splenitis.

CASE 23. A29901. Male, age 25 yrs. Clin. diagnosis, splenic anæmia. Not operated; autopsy

March 26, 1910. Spleen weight, 1160 grams; exterior smooth, mottled, firm; cut surface hard, fibrous; lymphoid tissue increased; some swelling of endothelium in dilated venous sinuses; marked fibrosis. Pathological diagnosis, chronic diffuse splenitis.

CASE 24. A7040. Male, age 45 yrs. Clin. diagnosis, atypical pernicious anæmia. Splenectomy February 9, 1910. Spleen weight, 1640 grams; exterior smooth, rather soft; cut surface soft, dark colored; lymphoid tissue increased; no apparent proliferation of endothelium; slight increase of connective tissue; very large amount of débris of broken-down blood cells and blood pigment. Pathological diagnosis, pernicious anæmia.

CASE 25. H17130. Male, age 10 yrs. Clin. diagnosis, splenic anæmia. Not operated; autopsy December 14, 1905. Spleen weight, 600 grams; exterior pale, hard, fibrous, capsule thickened; cut surface hard, fibrous; lymphoid tissue almost entirely absent; some proliferation of endothelium; very advanced fibrosis. Pathological diagnosis, diffuse chronic splenitis.

CASE 26. A64259. Female, age 20 yrs. Clin. diagnosis, splenic anæmia. Splenectomy February 26, 1912. Surgeon's diagnosis at operation, primary hepatic cirrhosis. Spleen weight, 750 grams. Pathological diagnosis, chronic splenitis.

CASE 27. A62258. Female, age 29 yrs. Clin. diagnosis, painful wandering spleen. Splenectomy January 22, 1912. Spleen weight 170 grams; organ, both grossly and microscopically, apparently quite normal.

CASE 28. A11038. Female, age 39 yrs. Clin. diagnosis, painful floating spleen. Splenectomy June 27, 1908. Spleen weight, 145 grams; exterior rough, hard; cut surface slightly fibrous, pale; apparently slight atrophy of lymphoid tissue; no change in endothelium or fibrous connective tissue. Pathological diagnosis, atrophy.

GENERAL DISCUSSION

Group I. Cases with a Positive Clinical Diagnosis of Splenic Anæmia.

Of the 18 cases on whom a positive clinical diagnosis of primary splenic anæmia was made, all presented the important diagnostic symptoms as laid down by Osler (33), namely, an enlarged spleen with the following blood picture: a reduced number of red cells, a reduced number of white cells without material variation from normal in the relative percentages of the several types, no leucocytosis, usually a leucopænia, a very low hæmoglobin, and a low color index. In all 18 cases, the clinical picture was sufficiently definite to warrant, even after the most critical review, a diagnosis of a secondary anæmia apparently due to a primary splenomegaly. Of the 18 cases operated on, 2 died at operation, and of the remaining 16, 11 have remained well for periods varying from six months to seven years. Of the remaining 6, 2 are improved, one died 3 years after operation with symptoms of cirrhosis, and 2 have not been heard from.

Fig. 1. Case No. 2. Splenic anæmia. Lymphoma type. Spl. Sec. x100, lymphoma area.

While these 18 cases presented clinical symptoms of such uniformity as to compel the clinician to group them together, the variation in their morbid anatomy is so great that for purposes of pathological description it becomes necessary to divide them into classes as follows:

Class A. Chronic lymphocytic hyperplasia. This class contains two cases, Nos. 1 and 2. In the first case, the spleen weighed 2190 grams, and in the second it weighed 3275 grams, or 13 and 19 times the normal weight, respectively (females). In both, the surface was smooth and the tissue was soft and dark red in color. On gross section, both were highly vascular, while the bands of connective tissue so prominent in spleens in Class C, were notable for their absence.

Microscopic examination of the spleens from these two cases shows in both an enormous increase of the lymphocytes of the parenchyma, with a relative thinning of the

Fig. 2. Case No. 2. Splenic anæmia. Lymphoma type. Spl. Sec. x100, vessel invaded.

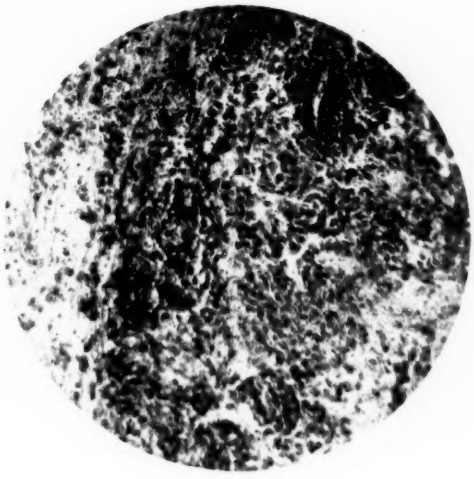

Fig. 3. Case No. 2. Splenic anæmia. Lymphoma type. Spl. Sec. x100, lymphosarcoma.

stroma and with no material proliferation of the endothelium of the venous sinuses. The lymphoid elements have so increased and so pressed upon adjoining structures as to obliterate all evidence of the Malpighian corpuscles, and, to a great extent, of the venous sinuses (Fig. 1). Besides the increase in the numbers of the lymphocytes, we find a large proportion of them swollen beyond their normal size. This condition of lymphocytic hyperplasia is so marked as to strongly suggest a neoplastic condition. In Case 2, several sections show blood-vessels (Fig. 2) whose walls in limited areas have been so infiltrated with lymphocytes that almost no fibrous tissue can be discerned within them.[1] Sections from areas near the hilum of the spleen from this case also show extensive infiltration of connective tissue bands by lymphocytes (Fig. 3). These two pictures were so marked that at operation a diagnosis of lymphosarcoma was made from the microscopic slides. A recent careful review of the slides made at the time of operation, and also of freshly made slides, confirms this diagnosis from the histological standpoint.

[1] A similar infiltration by lymphocytes of the arterial walls in the spleen of the normal bat has been noted by Downey and Weidenreich (37).

In the face of this picture, however, the fact remains that these patients, Nos. 1 and 2, who were operated on respectively five and one half and seven years ago, are both alive and well. It is thus highly improbable that any neoplastic growth existed outside the spleen in either case at the time of operation. When one considers the extent and character of the process in the spleen, it is difficult to conceive how a true lymphosarcoma, as we ordinarily define such, could have so long existed in so vascular an organ without the formation of metastases elsewhere. On the whole, then, it appears that we must materially modify our present concept of what constitutes a lymphoid hyperplasia, or, on the other hand, of what constitutes a lymphoma or lymphosarcoma, before we can place spleens of this type in either class. I am inclined to believe that while, in their final histological aspects, they may become true neoplasms (lymphosarcomata), both developmentally and clinically, their early stages represent only an extensive lymphocytic hyperplasia, with only a slight return of the cells to their primitive mesoblastic type. They certainly must be considered as quite distinct from such primary sarcomata of

Fig. 4. Case No. 3. Splenic anæmia. Gaucher type. Spl. Sec. mottled, marked fibrosis infarcted.

the spleen as that reported by Jepson and Albert (18).

Class B. Primary proliferation of the endothelium of the spleen. ("*Gaucher type.*") Our series contains three cases (Nos. 3, 4 and 5), in each of which the spleen presents a picture the most striking characteristic of which is an enormous proliferation of the endothelium of the venous sinuses. Two of these are the largest spleens of our series, No. 3 weighing 5280 grams, 31 times normal (female), and the other, No. 5, weighing 4500 grams, 26 times normal (female). The third, No. 4, weighed but 895 grams, 5 times normal. All these spleens presented a rough exterior. The appearance of the sections, however, both gross (Fig. 4) and microscopic, of the three cases varies much.

Case No. 3, which is a typical early "Gaucher spleen," will be described later in detail by Dr. Franz Wildner of this laboratory, who had made considerable study of the case before the final compilation of the data in this paper was begun.

In Case 4 (Fig. 5), the relative smallness of the spleen as compared with the other two cases of the class is readily understood on examination of the microscopic sections. There are only a few isolated areas of lymphoid tissue (Malpighian bodies). Almost all the venous sinuses are crowded with endothelial cells, closely resembling the pictures presented in slides from Case 3 (Fig. 6). In many of the sinuses, some or all of the cells are shrunken and have lost their definite outlines, merging into one another and thus showing that they are not only much pressed upon by the connective tissue, but also that they are in an early stage of degeneration. At the same time, surrounding the sinuses are broad bands of fibrous connective tissue, which give the appearance of having contracted and shut off the circulation from the endothelium of the sinuses. The giant cells in the venous sinuses in this case are so numerous as to have suggested the possibility of tuberculosis, which, however, has been excluded histologically and biologically. The process has apparently been an initial proliferation of the endothelium with a secondary connective tissue overgrowth, causing degeneration of the endothelium and a spleen which, while still enlarged (five times normal), is yet not nearly so large as that in either of the other two cases of the class. This patient was quite well when last heard from, two and one half years after the removal of her spleen.

The spleen from the third case (Fig. 7) in

this class, No. 5, is made up microscopically almost wholly of large spaces—apparently dilated venous sinuses—filled with what in most of them is a homogeneous colloid mass (Fig. 8). In some of the sinuses, however, remains of cellular elements can be made out, while in a few these elements are still plainly shown to be endothelial cells (Fig. 9). Surrounding these distended colloid-filled sinuses are broad bands of fibrous connective tissue, containing here and there remains of lymphoid elements and not presenting the contracted appearance of the fibrous connective tissue in case No. 4. The most reasonable interpretation of the pathological process in this spleen is that of a primary endothelial proliferation, a secondary connective tissue increase, and a colloid degeneration of the endothelium.

While, so far as I am aware, no other observer has reported so extensive a colloid degeneration in a spleen of the Gaucher type, it is probable that Marchand's (25) case was in a beginning stage of the same process, since Marchand notes particularly the peculiar homogeneous hyalin appearance of many of the cells. It is possible, also, that the fine linear markings on the endothelial cells, to which attention was first called by Mandelbaum and Libman (12), and which were to be made out in all three of our cases, may mark early stages in the process of degeneration in these structures.

Weichselbaum's (1) case of "primary multiple endothelial sarcoma of the spleen" was the first case of this type to find its way into the literature. Though Weichselbaum omits all clinical data from the report of his case, his description of the morbid histology leaves little doubt as to the character of the lesion. Gaucher (2) next described a case as "Splenomegalie primitive—Epithelioma primitive de la rate." Williamson's (3) case showed considerable fibrosis of the spleen, with "enormous numbers of large nucleated cells each containing six to ten red blood corpuscles" in the venous sinuses. Williamson's description is not as full as one could wish, and there remains considerable doubt whether or not his case was of this type. Collier (4) described the histological changes in the spleen of a case as an endothelioma. His specimens, however, were reviewed by the "Morbid Growths Committee" of the London Pathological Society, who noted the enormous number of endothelial cells, but thought the condition was not an endothelioma. Picou et Ramond (5) next described the lesions in the spleen from a case on which a successful splenectomy had been performed (the first in this group of cases). Bovaird's (9) cases were the first reported in America, and his thorough description of the pathology left little to be added by later observers. He was convinced that the essential lesion was an endothelial hyperplasia and not a neoplasm. Following Bovaird, Harris and Herzog (10) reported the first successfully operated case in America, and coincided with Bovaird that the chief histological change was an endothelial hyperplasia. The spleen in Rolleston's (13) case showed marked fibrosis and extensive endo-

Fig. 5. Case No. 4. Splenic anæmia. Late Gaucher type. Spl. Sec. mottled.

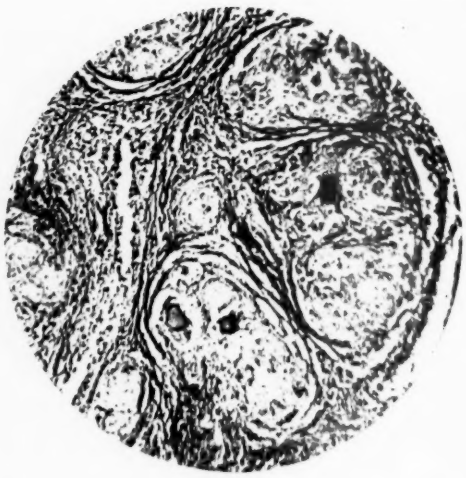

Fig. 6. Case No. 4. Splenic anæmia. Gaucher type. Spl. Sec. x100 diam. Beginning degree of proliferated endothelium giant cells and fibrosis.

thelial proliferation. Stengel's (17) case, that of a negro who had had more or less pain in the left side of the abdomen for many years, and on whom splenectomy was successfully performed by Dr. Clark, presented a spleen whose surface was covered with numerous nodules from one to three cm. in diameter. Histologically, there was enormous increase of the endothelium and fibrous connective tissue. There were many giant cells, and the endothelium so infiltrated the connective tissue that Stengel was convinced the condition was a true endothelioma. Histologically this case is apparently an exact counterpart of our case No. 4. Springthorp and Stirling (19) reported six cases in one family, on one of whom a successful splenectomy was performed. They describe the morbid histology in the spleen as "a great increase of the fibrillar framework of the spleen pulp made up of anastomosing processes of endothelial cells with their rounded or elongated nuclei." The spleen in Umber's (20) case showed numerous deposits of pigment; the venous sinuses filled with blood and many large mononuclear cells with fine pigment granules; and many giant cells in the Malpighian bodies. Mandelbaum and Libman (21 and 31) have made thorough pathological reports on two cases studied clinically by Brill. They were the first (21) to call attention to the peculiar linear markings to be seen with high power on the endothelial cells. They were also the first to call attention to the endothelial hyperplasia in the bone marrow. In their last report (31), following the suggestion of Schlagenhaufer (24) and Marchand (25), they concede that the large endothelial-like cells may arise from the normal endothelium or from normal reticulum. Judging from the cuts illustrating Mandelbaum and Libman's articles, the endothelial cells are much more closely packed than in our Case 3, while the connective tissue increase is not as great as in our Cases 4 and 5. O'Malley and O'Malley (22) report their studies on the spleen of a case which had been operated, and describe an endothelial proliferation and a marked connective tissue hyperplasia throughout the spleen. Schlagenhaufer's (24) case, like that of Gaucher, was complicated with tuberculosis. He concludes that the disease is a general one of the lymphohæmatopoietic system and thinks it is analogous to lymphosarcoma. He doubts the endothelial character of the large cells filling the venous sinuses, and suggests that they may be derived from the reticulum. Marchand (25), in the examination of the spleen from one case, notes especially the hyalin appearance of the endothelial cells, saying that it suggests an amyloid degeneration. He is in doubt as to the origin of these cells, but says they may arise either from the endothelium or from the reticulum.

Krompecher and von Herczel (23) in the study of one case conclude that the spleen was the seat of an inflammatory process or a benign new growth and are inclined to the latter opinion. de Jong and Van Heukelom (35), in the study of a spleen from a case which recovered after operation, decided that the cells in the venous sinuses had arisen from the reticulum, though they note that the possibility of an endothelial origin cannot be denied. The liver in their case continued to enlarge after splenectomy and they attribute this to a proliferation of the cells previously carried there from the spleen, though, of course, this is speculative. Rettig (32), Risel (33) and

Plehn (34) have also contributed to the literature of this type of splenomegaly. The most recent report is by Mandelbaum (38) who reports a case of a boy 4½ years old who died the next day after splenectomy. The spleen weighed 490 grams. Autopsy showed the liver and all mesenteric and retroperitoneal lymph nodes enlarged. After a careful study of the histology of this case, Mandelbaum concludes: "It is impossible to deny that a close relation exists between the reticulum and the large cells, even though one cannot find evidences of transition stages between them."

From my review of the cases presented in the literature, and a careful study of the spleens from our own three cases, it seems to me that our best interpretation of the histological pictures presented is that of a primary endothelial proliferation with a secondary proliferation of fibrous connective tissue, and ultimately a degeneration of the endothelium with contraction of the connective tissue. The survey of all the cases suggests a close analogy in their histology with what one meets with in hyperplasias of the thyroid and of the prostate, namely, an initial hyperplasia of the parenchyma filling the acini, a secondary increase of the stroma, and ultimately a degeneration of the parenchyma, with contraction of the connective tissue.

With relation to the origin of the large endothelial-like cells, they appear to me to be much more likely to have risen from the endothelium than from the reticulum. In this connection, it may not be amiss to recall that, though embryologically the spleen arises entirely from the mesoderm, yet soon after the first appearance of the splenic anlage, as a thickening of the dorsomesogastrium, the cœlomic epithelium covering it becomes arranged in multiple layers, the deeper ones of which change to mesenchymal type and become scattered throughout the spleen.

It seems to me unfortunate that the trend of medical thought was originally directed toward the consideration of these endothelial proliferations as true neoplasms, with the associated dread of malignancy, since it has no doubt operated to prevent surgeons from hazarding splenectomy; though, of the nine

Fig. 7. Case No. 5. Splenic anæmia. Late Gaucher type. Spl. Sec. mottled. Colloid deg. and adv. fibrosis.

cases which have been operated on, as reported in the literature, four have recovered, while the remaining five were in very bad condition before coming to operation.

Class C. Primary (chronic) diffuse hyperplasia of the spleen (chronic splenitis). In this pathological class are found 13 of our cases (Nos. 6 to 18.) The spleens are all large, weighing from 425 grams (two and one half times normal) to 1670 grams (nine times normal), with an average of 1089 grams (six times normal). The external surface of these spleens varies in roughness directly in proportion to the development of connective tissue

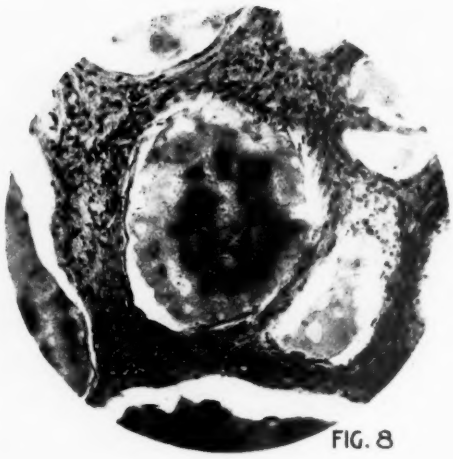

FIG. 8

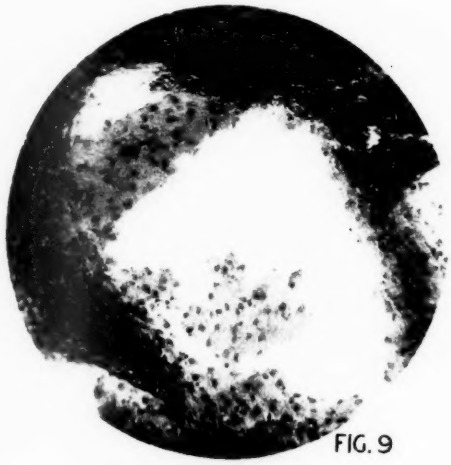

FIG. 9

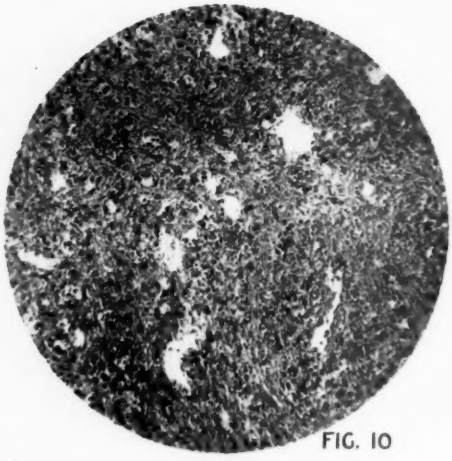

FIG. 10

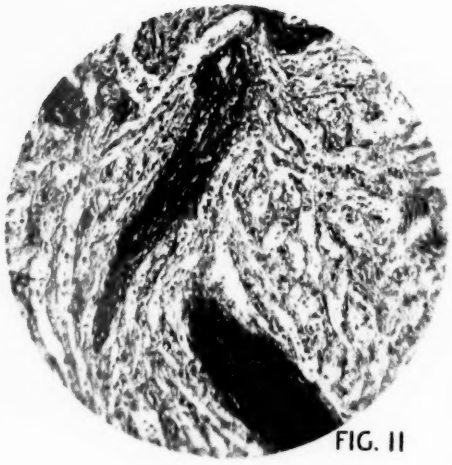

FIG. 11

Fig. 8. Case No. 5. Splenic anæmia. Late Gaucher type. Spl. Sec. x100. Colloid deg.

Fig. 9. Case No. 5. Splenic anæmia. Late Gaucher type. Spl. Sec. x100. Endothel. remains.

Fig. 10. Case No. 13. Splenic anæmia. Spl. Sec. x100. Chronic diffuse hyperplasia.

Fig. 11. Case No. 8. Splenic anæmia, with Banti's syndrome. Spl. Sec. x100 diam. Dilated capillaries and fibrosis.

within the organ. On gross section, all of them show more or less fibrosis with dilated vessels. Microscopically, there is a diffuse overgrowth of all the tissue elements, lymphoid, endothelial, and fibrous (Fig. 10). In several the lymphoid tissue is markedly increased, in most the connective tissue increase is very prominent, and in almost all there is some proliferation of the endothelium of the venous sinuses. In all of the cases with

marked connective tissue overgrowth, there is more or less sclerosis and atrophy of the pulp and Malpighian bodies. The latter frequently also show some hyalin degeneration. In several of the cases (Fig. 11) in which the fibrosis is most marked, dilatation of the capillaries and arteriosclerosis are also present. This process is especially marked in three cases which presented clinically the syndrome of Banti's disease and showed cirrhosis of the liver at operation. The pathology of this type of primary splenic anæmia has been so well described by Banti (6), Sippy (7), Osler (8 and 36), Wentworth (11), Warthin (16), Marchand (15), Simonds (26), Lyon (27), and others, that further description is unnecessary. The picture is that of primary chronic diffuse parenchymatous and interstitial inflammation. Whether this process is the result of a local micro-organismal invasion or of a locally acting toxin is undetermined, though hypothetically the latter is the more probable.

Group II. Cases with a Doubtful Clinical Diagnosis Falling between Splenic Anæmia and (a) Infection, (b) Pernicious Anæmia, or (c) Hepatic Cirrhosis.

In this clinical group are four cases (Nos. 19, 20, 21 and 22), on whom splenectomy was done, and one autopsy case, No. 23; and yet in whose histories the element of infection was so prominent as to make doubtful the clinical diagnosis. The spleens in these cases, while enlarged, are relatively smaller than those in the preceding group, ranging from 320 grams (two times normal) to 1340 grams (eight times normal), with an average of 800 grams (four and one half times normal).

In one of these cases, No. 19, the spleen, which weighed only 320 grams, shows only an increase of the parenchyma without endothelial or connective tissue proliferation. In this case, not only were the clinical data insufficient on which to base the diagnosis of splenic anæmia, but the pathological picture was also not that of the other clinically well-defined members of the group. The patient, however, is alive and well, about two years after operation.

In Case 20 the spleen, weighing 640 grams, was soft and showed an increased parenchyma and some increase of connective tissue. There was evidence of old and recent hæmorrhage in the numerous infarcts and areas of blood pigment. This case presented clinically a widespread infection of the upper abdomen and there is little in the pathological picture of the spleen to suggest its relationship to splenic anæmia. The patient died about six months after operation with symptoms of nephritis and general infection.

In Case 21 the spleen weighed 900 grams, with a rough, nodular exterior, and showed on section dilated vessels and marked fibrosis. Microscopically, the fibrosis was found to be quite diffuse, the lymphoid elements proliferated, and there was also some proliferation of the endothelium of the venous sinuses. This case was complicated clinically with a doubtful history of tuberculosis and syphilis. Pathologically, one could not distinguish it from members of Group I, clinically splenic anæmia. The patient died, two months after operation, of nephritis complicated by pleurisy with effusion.

Case 22 had had Raynaud's disease five years before operation and gallstones were found at operation, at which time also a 1340-gram spleen was removed. The surface was rough, hard, nodular, and on section showed a marked fibrosis. Microscopically, the fibrous overgrowth is found to be diffuse, the venous sinuses shrunken, with no endothelial proliferation, and there is no marked hyperplasia of the lymphoid elements.

Case 23 was a male 25 years of age who had been sick for two years. At the time he was examined, a few weeks before his death, he presented an enlarged spleen with a red blood count of 2,900,000, a leucocyte count of 5,200, and hæmoglobin of 67 per cent. Later his leucocyte count went up to 13,000. His color index was always one or above. This patient came to autopsy, without operation, through an intercurrent lobar pneumonia. Aside from the pneumonia, the liver was found slightly enlarged and fatty and there was some chronic nephritis. The spleen weighed 1160 grams (six times normal). It was smooth, mottled on gross section, firm, and fibrous. Microscopically, there is a very marked fibrosis and the venous sinuses are dilated, but without any marked proliferation of the endothelium.

In the list of cases with a doubtful clinical diagnosis of splenic anæmia are two which a fuller clinical review seems to place in a group of atypical pernicious anæmias. The first of these, Case 24, was a male, age 27 years. Splenectomy, February 9, 1910. The spleen weighed 1640 grams. It was smooth, evenly marked, showed but a slight increase of fibrous connective tissue, but an enormous amount of blood pigment and débris of broken-down blood cells. The patient died six months later without any material interruption having been made in his chain of symptoms by the operation. The pathological findings in this case suggest pernicious anæmia.

Case 25, on whom a doubtful clinical diagnosis of splenic anæmia or pernicious anæmia was made, was that of a child 10 years of age, who was in a moribund condition when brought to the hospital and who died two days later without operation. His blood picture presented some of the characteristics of pernicious anæmia (r.b.c., 1,013,000; leuc., 13,000; normoblasts, megaloblasts, myelo-

cytes, and marked poikilocytosis; hæmoglobin 15 per cent), and there had been recurrent hæmorrhages from the bowels for a year. At autopsy, aside from small areas of submucous hæmorrhage throughout both large and small intestines, the only pathological condition found was a spleen three times normal size, pale, hard, and fibrous, and a much enlarged liver which was light in color and soft. Histologically, the spleen showed a thickened capsule with very advanced fibrosis and almost entire absence of lymphoid elements. When stained for iron, neither spleen nor liver showed the deposit so common in cases of pernicious anæmia.

Case 26 was a female 20 years of age, on whom a doubtful clinical diagnosis of splenic anæmia was made. At operation, February 26, 1912, the surgeon made a diagnosis of probable primary cirrhosis of the liver. A spleen weighing 750 grams was removed. The patient died two months after operation.

Group III. Cases of Splenectomy for Conditions Other than Splenic Anæmia.

Case 27 was a female, age 29 years, on whom a clinical diagnosis of painful wandering spleen was made. Splenectomy was performed January 22, 1912. A spleen weighing 170 grams and apparently normal in all respects was removed.

Case 28 was a female, age 29 years, on whom a clinical diagnosis of painful wandering spleen was made. Splenectomy was performed June 27, 1908. The spleen weighed 145 grams and showed a somewhat atrophied parenchyma, but was otherwise normal.

Splenectomy was done in both of the above cases for the relief of pain, and was successful in both.

It will thus be seen from this brief description of the above eleven cases that three (Nos. 21, 23, and 25) which were clinically doubtful splenic anæmias were indistinguishable pathologically from those cases on which the clinical diagnoses were positive. However, Case 21 gave a doubtful history of associated tuberculosis, Case 23 of an intercurrent infection (pneumonia), and Case 25 was a child and practically moribund when first examined at this clinic.

GENERAL SUMMARY

1. Pathological study of 18 spleens removed at operation in the Mayo Clinic from November 14, 1905, to November 1, 1912, from patients on whom positive clinical diagnoses of splenic anæmia had been made, shows that in each spleen there was hyperplasia of one or more of the constituent tissue elements. In two spleens, the lymphoid tissue was so markedly overgrown as to suggest a diagnosis in one of lymphoma and in the other of lymphosarcoma. In three spleens, the proliferation of the endothelium of the venous sinuses was most predominant. In 13 spleens, the process was a chronic diffuse one involving all tissue elements.

2. While any case of primary splenomegaly may begin as an overgrowth of the lymphoid tissue or of the endothelium, in the ordinary course of events a secondary overgrowth of the stroma of the gland will later appear, accompanied by degeneration of the lymphoid or endothelial elements.

3. The largest spleens are those in which the lymphoid or endothelial hyperplasia is greatest. As the connective tissue overgrows, the spleen may be reduced in size owing to reduction in the amount of the lymphoid and endothelial elements.

4. The roughness of the exterior of the spleen is in direct proportion to the development of connective tissue within it.

5. In primary splenomegaly, a secondary cirrhosis of the liver is associated with great connective tissue overgrowth and degeneration of the pulp of the spleen.

6. From what we know of hyperplasias in other organs it would seem unnecessary to assume hypothetically the presence of three different causes for the production of the three primary histological types of splenic anæmia.

7. The histopathological picture presented in all three types of spleens from cases of primary splenic anæmia seem to be in complete harmony with the hypothesis of the presence of a slowly acting local toxin.

8. There are certainly spleens from clinically doubtful cases of splenic anæmia which the pathologist cannot distinguish from the spleens from clinically undoubted cases. Yet it must be conceded that the finding of a great hyperplasia of one or all of the tissue elements of the spleen, without other diagnostic lesions elsewhere in the body, is strong corroborative evidence of the clinical diagnosis of splenic anæmia.

In conclusion I wish to thank Dr. Franz Wildner of this laboratory for the use of sections from some of the cases, prepared under his careful direction, and which will be

more fully described by him in an early forthcoming article on certain features of the pathology of the spleen. I am also under obligations to Dr. H. Z. Giffin for the clinical notes which he has so kindly supplied.

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THE EXTENDED ABDOMINAL RADICAL OPERATION FOR CANCER OF THE UTERUS[1]

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THE history of the radical abdominal operation for cancer of the uterus was inaugurated by W. A. Freund, who began systematically in 1878 with the abdominal route for the extirpation of the cancerous uterus. But the mortality of this operation was so enormous that it was abandoned very soon in favor of the vaginal methods. Afterwards taken up again, the abdominal method made considerable progress, when Rumpf dissected first the ureters, Ries proposed the removal of the pelvic lymphatic glands, and Clark exposed the ureters in ten cases for the purpose of removing as much as possible of the parametria.

Such a state of affairs Wertheim found when he began, in 1898, instead of Freund's operation, to elaborate a radical method relying upon modern surgical principles, which should be able to remove not only the cancerous uterus but also the pelvic connective tissue and the regional lymphatic glands.

These two points characterize the radical operation: widest excision of the parametria and removal of the pelvic glands. And, what is to be mentioned as a very important point: in order to get out as much parametrium as possible, one has to expose the ureters and to push them far away as a preventive measure.

The technique of the operation is as follows:

[1] Read before the Clinical Congress of Surgeons of North America, New York City, November 14, 1912

Scraping and cauterizing of the cancer immediately before the laparotomy without anæsthesia, in order to save the patient's heart. Trendelenburg's position. Incision in the median line; wide separation of the bladder from the uterus and the vagina; tying of the lig. inf.-pelv. and rot. Dividing the two layers of the broad ligament. The ureter is to be exposed up to the entrance into the parametrium without isolating it. Here the ureter is crossed and covered by the uterine vessels. The index finger is pushed through the parametrium between ureter and vessels, thereby isolating the uterine vessels. By these means, the ureter is protected during the ligation of artery and vein. By this procedure the whole pelvic portion of the ureter becomes so accessible that it is easy now to complete the separation of the ureter. Separation of the rectum from the vagina is the next step.

Wide excision of the parametrium, after having put on bent clamps for the avoidance of hæmorrhage. Two strong right-angle clamps are now applied to the already isolated vagina, so that the cancerous tissue is completely enclosed, thereby preventing its coming in contact with the wound after the opening of the vagina.

The next step is the removal of the lymph glands. They lie along the common iliac, the external, and the hypogastric iliac, and in the trigonum between both, also downwards to the obturator foramen and high up as far as the division of the aorta. We never search higher than this point for glands, and extirpate only enlarged ones, for we never found cancer in glands of normal size.

The pelvic wound is always drained by iodoform gauze and the peritoneum is closed carefully. But if there is not enough peritoneal material, or if this is infected, we refrain from the complete closing of the peritoneum.

The ureter plays an important rôle in this operation. By freeing it from the parametrium it is not always possible to avoid injuries, isolations, or even lesions. It is often necessary to dig the ureter out of the cancerous infiltrated parametrium, so that the uterus shows afterward a deep sulcus, representing the place where the ureter was fixed. Some operators prefer to resect the ureter, when it is firmly fixed, without losing the time required to dissect it out; they consider it the only proper way to operate radically. But the microscopic examination of the resected ureters shows that the cancer involves the ureter wall very seldom and very late. We always prefer to dissect the ureters, even in the most advanced cases, and the number of our resections with implantation in the bladder is therefore small — only 1.5 per cent of all cases operated on. The control of the cases with fixed ureters operated in this way convinced us that our method is right, because we found many of such cases free from recurrence. It is a fact that the nourishment and function of the ureter is sometimes disturbed in spite of all care used during the operation, for the ureter can be isolated, displaced, and bent as the result of the operation. In about 6 per cent of all our cases we got a ureterovaginal fistula, coming in the second or third week after the operation through secondary necrosis of the ureteral wall. Such fistulæ closed themselves spontaneously in 60 per cent; the other cases, surviving the operation, got an ascendant infection with the well-known consequences and complications. Operative treatment is here unavoidable, and we prefer nephrectomy to the implantation of the ureter into the bladder. But also without fistula, ureter and pelvis of kidney can be infected as a consequence of the injuries of the ureteral wall during the operation. Many of these cases running a little temperature in the first weeks after the operation are afflicted with ureteritis and pyelitis.

The bladder is often involved by cancer and fixed to the uterus; in such cases the preparation gives difficulties, and it is not always possible to avoid injuries and lesions of the bladder. Here we recommend resections of the bladder, because they are only small complications of the radical operation in contrast to the resection and implantation of the ureters.

Very seldom the rectum is affected by cancer, and in only a few cases we found it necessary to resect the rectum.

A very important point is the question of the removal of the glands, and a success from the extirpation of the cancerous glands must

be a victory of the abdominal method, since it is impossible to remove the glands by vaginal route. In 25 per cent of all cases we found cancerous glands, and nearly all of these died from recurrence. Notwithstanding, we adhere firmly to the principle of removing cancerous or suspicious glands, and we have now ten cases with cancerous glands being free from recurrence more than five years after the operation. These cases could surely not have been cured if they had been operated by vaginal route.

A point of great importance is the anæsthesia. If it is a general narcosis, it must be as short as possible. In every case not suitable for general narcosis we use spinal anæsthesia, or we mix chloroform and ether with oxygen in Roth-Draeger's apparatus.

According to this plan, from 1898 to 1912 we operated 675 cases of cancer of the cervix; the cases of body cancer are not included, being anatomically and clinically quite different from the cervix cancer.

All together, during these fourteen years 1,430 cases of cervix cancer were examined in our clinic; 71 of these refused the proposed operation, 684 were inoperable, and 675 were subjected to the radical abdominal operation. Consequently we have, on an average, 50 per cent operability. The operability raised from 42 per cent under the first 250 cases to 52 per cent in the third to fifth hundred, and amounts now to 55 per cent under the last 175 cases. In regard to the indication for the operation, it is very difficult to explain exactly when a case of cervix cancer is to be called inoperable. We have to consider the infiltration of the parametrium, the fixation of bladder and rectum, enlarged glands on the pelvic wall compacted together and eventually palpable through the abdominal wall, and, as a very important point, the general condition of the patient, especially the condition of the heart, cachexia, and the age of the patient.

In some advanced cases one determines to a certainty whether an operation is possible or not only by the exploratory laparotomy. First we palpate the glands on the pelvic wall; if these are large, fixed, hard masses adherent to the big vessels, and if they are located high up along the aorta, the case is inoperable — the uterus may be movable or fixed. Dilatation of the ureters is no contraindication for the operation, but it is a sign of bad infiltration in the parametrium and makes a resection of the ureters sometimes necessary. Naturally, fixation of bladder and rectum is an unfavorable symptom.

If the uterus is left behind, the operation is to be considered an exploratory laparotomy and the case is inoperable; but if the uterus is removed, the case must be classed as radically operated.

The greatest detriment to Freund's operation, and afterwards to every other abdominal method, was the high primary mortality. Really our first hundred cases gave a mortality of 30 per cent; but this number was constantly reduced, amounted in the fifth hundred to only 15 per cent, and is now, under the last 175 cases, just 9 per cent, including every death in any manner connected with the operation. The women died mostly of peritonitis, paralysis of the intestine, degeneration of the heart, embolus and pyelonephritis — seldom from other complications.

This excellent effect of our efforts to diminish the danger of the operation was not attained by an especially critical selection of the operated cases; it is a success of continually improving the technique and of the correct use of the anæsthesia.

Every rise of the operability is connected with an increase of the mortality, and operators with the astonishing number of 80 per cent or even 90 per cent operability report a mortality of 20 per cent and more. Our operability is much smaller than the operability of many other men because our material is especially bad, and we refuse to operate cases which are absolutely hopeless for permanent cure.

Our standpoint in this question is established by Wertheim as follows: We see the possibility of improving the after-results in the most exact performance of the operation, but not in the raising of the operability. And the most exact performance of the operation can be attained without increasing the mortality.

We could not find that particularly young age or pregnancy simultaneous with the can-

cer of the cervix, had an unfavorable influence on the prognosis.

In regard to the recurrence, we found nearly all these in the glands on the lateral pelvic wall, seldom local recurrences in the vaginal scar and in the bladder.

We don't expect much of operations for recurrences, and we did just a few operations of this kind.

In criticising the results of an operation for cancer of the uterus it is necessary to control the cases at least five years after the operation, and we are not allowed to consider a case cured before these five years have elapsed.

Of our 675 cases, 380 are now, at the end of five or more years since the operation, so that we can use them for criticising the value of Wertheim's method. During the same time in which we operated these cases, we examined in the clinic 863 cases of cervix cancer, of which 36 refused the proposed operation, 447 were inoperable, and 380, as mentioned, were subjected to the radical operation. Eight of these 380 died from intercurrent diseases, and 160 were well and free from recurrence at the end of five years. Just one case was lost sight of. In criticising the value of the operation, one has two points of view:

1. We have to calculate how many of all cases subjected to the radical abdominal operation are free from recurrence at the end of five years. We call it after results.

2. We have to calculate how many of all cases examined in the clinic (including the inoperable ones) are well and free of cancer at the end of five years. We call it absolute efficacy (absolute percentage of cures).

In the second calculation, the operability has an important influence on the permanent results.

Cancer statistics are then only good if you can determine the condition of all operated cases. If a case is lost sight of, you have to consider it as a recurrence. If a case died from some intercurrent disease in no way connected with the primary cancer, you have to deduct it; if you can't exclude this connection, you have to put it to the recurrences.

We calculate our after results as follows: 380 were operated, 8 of these died from intercurrent diseases and 160 were well and free of recurrence; therefore we could permanently cure 43 per cent of all operated cases. If we leave the primary deaths out of the calculation (because they can't come into consideration with respect to the after results), we have 53 per cent permanent cures of all cases surviving the operation.

Calculating the absolute efficacy we get the following results: 863 cases with cancer of the cervix were examined in this five-year period, 36 of them refused the proposed operation, and 8 died from intercurrent diseases; from the rest (819) 160 cases were well and free of cancer. It is 19.5 per cent absolute efficacy, 1 per cent more than we had in the first 250 cases.

With these results we can say that the radical abdominal operation for cancer of the uterus cured permanently a fifth of all these cases we examined in the clinic; it cured permanently 43 per cent of all operated and 53 per cent of all cases surviving the operation. In the last 175 operations we have been able to reduce the primary mortality to 9 per cent.

The raising of the operability, the permanent falling of the mortality, and the increasing improvement in our operative technique allow us to hope that we will be able to report much better results in the next years, when our present cases will have passed the five-year period.

THE RADICAL ABDOMINAL OPERATION FOR CANCER OF THE UTERUS[1]

By JOHN G. CLARK, M. D., Philadelphia

SINCE the inauguration of a more radical operation for cancer of the uterus, surgical critics have been ranged on one or the other side of the question as energetic antagonists or ardent sponsors. With such a radical operation it is inevitable that the primary mortality must be high, the surgical accidents and sequelæ numerous and more or less distressing; and even among the most optimistic advocates the consensus of opinion has been that unless the percentage of permanent cures is to be considerably increased, it must be abandoned in favor of less hazardous procedures. To Wertheim belongs the credit of having actively carried forward and simplified the technical details of a more radical operation suggested by Riess, Rumpf, and myself. From the first report of his smaller series of cases until the recent appearance of his monograph covering five hundred completed histories, his efforts have been persistent, even in the face of a very high primary mortality. His final conclusions are incontrovertibly in favor of the operation as executed in his own hands and those of Zweifel, Krönig, Bumm, Frantz and others. While these results have been obtained by a few specialists with a very abundant clinical material, they are not likely to be duplicated, because of technical difficulties by those of lesser opportunities. Even in Wertheim's series of five hundred cases the primary mortality is shockingly high, being followed in his first hundred by a thirty per cent death rate; in his second hundred, by twenty-two; while, even in his fifth hundred, it was still as high as fifteen per cent. Certainly, this is not an encouraging outlook for men of lesser opportunities to contemplate. It matters not for what an operation is performed, there are but few surgeons in America so temperamentally constituted that they can work ahead with great enthusiasm in the face of primary mortality of one in four, or twenty-five per cent, and further, to see the survivors pass through the trying ordeals of a s ormy convalescence, attended with many grave post-operative sequelæ. In the radical operation, it is only through the development of a most perfect technique that the hazards of death and serious surgical accidents may be diminished to even a moderate degree.

It is particularly opportune that this question has been brought before the American Gynecological Society for discussion; for it is now more than a decade and a half since the radical operation was first proposed, and statistics sufficiently comprehensive should be available to help us in deciding whether it offers a sufficient increase in permanent cures to justify its adoption by the great rank and file of surgeons of this country. The universal benefit of any medical or surgical measure cannot be great if its execution is so difficult as to render it highly hazardous except in the hands of a very few specialists.

My experience, so far as permanent cures are concerned, has not thus far sustained my hopes for greatly improved results; yet the criticism of my efforts may possibly be the same as that offered by Wertheim in commenting upon von Rosthorn's first series of cases, which was attended with a comparatively small primary death rate, but a high percentage of recurrences—namely, that this indicated a failure to really effect a widely extended excision of parametrium and vagina. With increasing enthusiasm for the principles underlying this operation, von Rosthorn became still more radical and his mortality quickly increased to a much higher rate; and although he believed that the survivors would show a proportionally greater freedom from recurrences, Schottländer's and Kermanner's recent review of his cases do not brilliantly sustain this anticipation.

In Cullen's comprehensive monograph (Cancer of the Uterus, 1900) the cases of cancer of the uterus operated upon in the

[1] Read before the American Gynecological Society, Baltimore, 1912.

Johns Hopkins Hospital by various methods were reviewed, and, so far as possible, the post-operative results were accurately determined. My first case was operated upon in the Johns Hopkins Hospital by a more radical method in June, 1895, and during the next year and a half twelve cases were subjected to this measure with more or less technical variations. Through Dr. Kelly's generous desire to give me every opportunity to elaborate this plan, several cases were turned over to me for operation.

In all, there were twelve; in some, the glands were removed; in others, there was only a wide excision of a vaginal cuff and as much parametrium as possible. There was one operative death. Among the survivors, four could not be traced, one died in three months, one in nine months, one in ten months, one in thirteen months, and another, four years after operation. Two were alive at the time of publication of Cullen's book, without evidence of recurrence, three and a half years after operation.

Of this series, therefore, we can only assume that the last two cases may be cured. According to continental statisticians, the cases that cannot be traced must be counted among the failures. This rule makes it impossible to reach any definite conclusions as to accurate final results in our larger American cities; for the perfect system of police registration in the continental municipalities does not obtain with us, and it is rarely possible to follow patients after they have changed their address twice. This has been noted in the futile attempts to trace several of my cases operated upon in the Hospital of the University of Pennsylvania.

The failure to obtain better results in this first series of cases, and others subsequently operated upon in Philadelphia, casts doubt upon the efficiency of this more extensive procedure, and, while I still adhered to the principle, I felt that I had either applied the operation to too far advanced cases or that there had been a failure to really effect the widest possible excision of locally involved tissue. With increasing experience, the difficulty and even the impossibility of really executing a truly extensive glandular dissection caused me to abandon this attempt; for, it unduly lengthened the time of the operation with a coincident increase in primary mortality, as well as an increase in operative mishaps and post-operative complications. Hence, I confined my efforts to the widest possible excision of the parametrium, with as large a vaginal cuff as possible, contenting myself with the removal of one or more glands, if palpably enlarged, for prognostic purposes. My conviction was based upon the following points:

1. The absence, as yet, of any known law concerning metastasis; for, as already demonstrated, the glands of the side of greatest local involvement may be free, while the parametrium, or higher glands of the opposite side, may show microscopic foci.

2. The unreliability of the microscopic appearance of a gland in determining metastasis; for, a large, palpable gland may be removed painstakingly from the bifurcation of the iliacs, and prove to be of an inflammatory character only; while an invisible lymph radicle, or a microscopic focus, immediately adjacent, may be the lodgment place for cancer cells.

3. The absence of any law as to what type of case gives metastasis. A very limited local process may show wide glandular metastasis, whereas the opposite may be true in the extensive involvement.

4. The peculiar distribution of metastasis, in that occasionally a lower group of glands may escape metastasis, whereas those above are involved.

Concerning the question of glandular extirpation, it now appears evident that if the higher pelvic lymphatic system is the seat of metastasis, it is scarcely possible for the widest and most painstaking dissection completely to eradicate it. That this forecast has been sustained is shown in Wertheim's report; for, in his large series of cases that had passed over the five-year period, there were only five survivors in whom the lymphatic glands were involved at the time of the operation. All of the rest are dead. I am aware of the earnest contention in favor of this part of the operation by Aulhorn, Mackenrodt, Rises and others, but, in view

of the objections just noted and in the face of the failure of the advocates to sustain their position by a much higher percentage of cures in the cases of glandular metastasis, it is self-evident that at the worst we are making but a slight error in this limitation, which will be offset by a lesser primary death rate.

In a monograph of nearly eight hundred pages[1] by Schottländer and Kermanner are detailed in extenso the cases of von Rosthorn in his clinics at Graz, Heidelberg, and Vienna, comprising in all 256 abdominal operations, distributed as follows: Graz, 85; Heidelberg, 77; Vienna, 94. In the first series of twenty-seven cases that came under the five-year period, there were 20 per cent cured. Of the remaining fifty-eight, 24.1 per cent died from the primary effects of the operation, one died of intercurrent disease, and eight could not be located, leaving eighteen alive over two and one half years after operation. Von Rosthorn's experience with the radical operation in the Graz Clinic was very unsatisfactory. In his laudable desire to give the fairest trial to this operation, he attributed his failure to effect more cures to the fact that he had not excised a sufficient cuff of the vagina.

Upon assuming the directorship of the Heidelberg Clinic, he endeavored to correct this defect, and at once noted a very decided increase in primary mortality; and, although there was a larger percentage of permanent cures among the survivors, the final results, reckoned from the standpoints of primary mortality plus subsequent deaths from recurrence, were only slightly better than with the less extensive operation in Graz.

After von Rosthorn was called to the University Clinic in Vienna, ninety-four cases were operated upon. Ten died from the primary effects of the operation, leaving eighty-four for final study. At the time of publication of Schottländer's and Kermanner's monograph, there had already been noted twenty-four recurrences. The remainder cannot be utilized in considering permanent cures, because of the short time since the operation.

In such a radical procedure, very serious surgical accidents occur, which may so far militate against it as to raise the question as to whether the game is really worth the candle. The study of cases of cancer, therefore, should not be based alone upon mortality statistics, for the prolongation of life with some wretched operative complication hardly justifies the salvage.

Thus, in von Rosthorn's entire series of 256 operations, the bladder was more or less seriously injured in forty-one cases (16.41 per cent). The majority of these fistulæ were repaired at the time of the operation, but several remained more or less permanent for some time. Four required subsequent operation, and eleven remained permanently patulous. In 6.25 per cent there were injuries to the ureters. In 3 per cent there were lacerations of the rectum, and in one case the obturator nerve was cut, causing permanent crippling of the leg. Secondary necrosis of the bladder occurred during the convalescence in 6.25 per cent of cases. Secondary ureteral fistulæ were noted in 7.03 per cent of cases. Other complications, such as intestinal fistulæ, etc., are recorded in a small percentage of cases.

In concluding this review of von Rosthorn's cases, Schottländer and Kermanner do not reach a positive conclusion as to the final value of the radical operation, reiterating the conservative opinion expressed by von Rosthorn in one of his earlier papers published in 1906, as follows: "We do not wish to overvalue, nor yet to undervalue, the radical abdominal operation, for we are still in the beginning of its development." Von Rosthorn further stated that, theoretically, this procedure offered the most effective possible way thus far suggested of reaching the best results, but it would still require a long time to arrive at final conclusions as to whether these principles, when carried into effect, really will be justified by better results than the less hazardous methods hitherto in vogue. The latest results and the most favorable of all so far as permanent cures are concerned, are those of Krönig, reported by Busse.[2] He gives in more or less detail the results of 59 operations by Krönig in Jena, with 25.3 per cent ultimate cures

[1] Zur Kenntnis des Uteruskarzinoms. 1912.

[2] Ueber Dauerresultate bei der Operation des Uteruskarzinomes nach den abdominalen Methoden. Monats. f. Geburts. u. Gynäk., Jan., 1912.

after the five-year period, reckoned according to Waldstein's formula. Krönig has been very radical in advanced cases, with a very high primary mortality; but the increased percentage of cures may justify his query as to whether we may not hope to reach the best ultimate results by the most radical operation in even the very far advanced cases. Before taking this view, however, we should weigh other considerations, which I shall mention later. His experience in Jena causes him to advance his standard to the very extreme of operability, and he believes that even Wertheim is too conservative in this particular.

In attempting to reach a final estimate of the value of the radical operation, one must compare carefully all reports from authoritative sources on other operations. Thus von Ott,[1] who is recognized as a very skillful technition, compares the radical abdominal, the radical vaginal, and the simple vaginal hysterectomy. He believes that an estimate of the value of the three methods should be founded not alone upon the number of the patients which are permanently cured, but also upon the immediate danger which is associated with each method. The crux of any ideal operation is a small primary mortality, freedom from operative accidents and post-operative sequelæ, and the highest percentage of permanent cures.

In weighing statistics, he compares Wertheim's radical abdominal operation, Staude's and Schauta's radical vaginal method (Schuchart's operation) and his own, the simple vaginal method, as follows:

	Radical Abdominal Method, Wertheim	Radical Vaginal Method, Staude	Radical Vaginal Method, Schauta	Simple Vaginal Method, v. Ott
Cases operated upon for five or more years	116	58	47	191
Deaths following operation	27	9	9	4
Mortality (percentage)	23.3	15.5	19.1	2.1
Absolute percentage of cures (Winter's computation method)	24.7	23	16.7	15.5
Absolute percentage of cures according to Waldstein	19.16	.....	13.5	15.1

From this table, it is quite evident that although the abdominal radical operation carries an exaggeratedly higher mortality, in the final casting up of accounts, the permanent cures, although very decidedly better, exact a very high primary death toll.

In comparing the Schuchardt method, as executed by its exponent Schauta, with the radical method of Wertheim, we may say with great certainty that its value, as demonstrated in Schauta's hands, has fallen short of the standard set by the latter. The cures reported by Wertheim are 57.6 per cent while Schauta's were only 38.2 per cent. From a comparison of these statistics, it is evident that the Schuchardt method will never have many exponents; for it requires quite as much skill, is attended with a high primary mortality, and is followed by a very large percentage of post-operative accidents.

Further, it bears the serious disadvantage, which all extensive vaginal hysterectomies bear, that the most critical part of the work is done under touch. Even in the hands of the average skilled operator, it would be attended by wretched consequences.

The primary mortality among German and Austrian operators varies widely, and there are wide divergencies in ultimate results. Thus the primary mortality among the leading exponents of the radical operation is as follows: Wertheim, 18 per cent; Zweifel, 8.5 per cent; Döderlein, 18.2 per cent; Bumm, 21 per cent; and Krönig, 25.4 per cent. Both Krönig and Wertheim claim that the high primary rate of mortality indicates the thoroughness of extirpation of the uterus, parametrium, and vagina, and criticise von Rosthorn's first series of cases because his death rate was only 6 per cent, and yet, as already pointed out, even von Rosthorn's later and more radical efforts did not bring a compensatory return. Now come the discrepancies which statistics so frequently show — Zweifel, who has a higher rate of operability than Wertheim, a ratio of 45 per cent by one as against 43 per cent by the other, had only 8.5 per cent primary mortality with a permanent salvage after five years of 20.46 per cent as against 18.4 by Wertheim.

These statistics confuse us, and we are naturally puzzled over these wide differences in the hands of men presumably of equal

[1] Zentralbl. f. Gynäk., 1909, No. 19.

ability. Certainly neither Wertheim nor Krönig are justified in criticising von Rosthorn's bad results because his primary mortality was only 6 per cent when Zweifel, who operates upon 45 per cent of all cases applying to his clinic with only an 8.5 per cent primary mortality, claims a percentage of permanent cures decidedly better than Wertheim.

I have quoted rather extensively from the statistics of these leading gynecologists in Germany and Austria, for the radical operation has been more extensively carried out in those countries than in America.

If an operation, or other therapeutic procedure, is to have a permanent place in our armamentarium, it must be sufficiently easy to make it available, not for a few skilled specialists, but for the great body of surgeons working in every quarter of this and other countries. In these days of low primary percentages attending nearly all the major operations, no operation can possibly gain extensive headway which carries with it a shockingly high mortality and a large number of distressing and disabling sequelæ. Further, while the continental surgeon, with his large and overcrowded clinics, may ignore the question of mortality in working out a principle, the American surgeon, as well as the American layman, is so temperamentally constituted that the one cannot and the other will not disregard a high primary death rate except in operations of direst emergency. The effect upon the lay mind, therefore, must be taken into consideration, for while one may have over 50 per cent ultimate cures, the effect upon the average intelligent citizen is abhorrent if, for this number of survivors, there have been 25 deaths, and for the other 25, a wretched existence, attended by repulsive post-operative sequelæ, followed by a torturing and lingering death. We must remember that these cases are not rushed to our hospitals in extremis, but walk in apparently in perfect health. The very nature of their disease makes these women secretive, and their friends and neighbors seldom know of their illness until they hear that they have been operated upon. Even the survivors leave the hospital, and do not talk of their ills; indeed, they are usually kept in ignorance of its true nature. If they die, however, all know about the surgical tragedy. In other words, as I have parodied in another paper two lines in Mark Antony's funeral oration — "The evils of cancer operations live after them, the good is interred with their bodies." We have all seen the widespread prejudicial effects of a fistula among the circle of a patient's criticising friends. After all, the layman only counts as the final test of surgery, successful results, as represented by a restoration to health with a maximum percentage of surgical safety. The specialist therefore who may even save the largest number of cases may drive away many others through his unavoidable high death rate and surgical accidents incident to this salvage. With this view of the situation, no one should be censured who regards with favor von Ott's opinion — that an operation, such as a simple vaginal hysterectomy, with a very small primary mortality and almost no complications, is preferable when one casts aside the purely surgical consideration and takes into account the layman's estimate of results. The population with which we deal is quite different from the great stream of humanity flowing into the German and Austrian clinics, for there, the peasant population is usually ignorant and its afflicted members stoically accept their fate, whether it be good or bad. It is possible that when we make a final summary of our combined experience we may have to accept the conclusion that a less radical operation, even though it ultimately saves fewer cases, may be preferable when attended by a low surgical mortality and few or no operative sequelæ. What will be infinitely better and what we ardently hope for is that the present operation, which embodies correct principles, may be further improved and thus eliminate the high mortality now generally attending it. The gradual lowering of the death rate in many hands offers the forecast that we may yet achieve better results. If this follows, every argument will then be in favor of the radical operation until some other more effective means of combating this disease supplants it.

SUMMARY OF CASES OF CANCER OPERATED UPON BY ABDOMINAL HYSTERECTOMY OF A MORE RADICAL TYPE IN THE GYNECOLOGICAL CLINIC OF THE UNIVERSITY HOSPITAL:

In the study of my cases, I have included only those patients operated upon in the University Hospital, because the records of these cases are much more complete than those in other hospitals with which I am associated. Even here, it has been impossible to trace all of these patients, thus leaving a considerable hiatus in the final summary of results.

In this review, it will be seen that the operative accidents, such as fistulæ, suppuration of the abdominal incision, etc., have been about the same as those noted by other operators. Briefly summarized, my results are as follows:

CARCINOMA OF CERVIX

Total number of cases		36
Operative deaths (peritonitis)	3	
Died from recurrence in 3 months	1	
Died from recurrence in 6 months	3	
Died from recurrence in 10 months	1	
Died from recurrence in 12 months	2	
Died from recurrence in 15 months	1	
Died from recurrence in 18 months	3	
Died from recurrence in 2 years	5	
Unable to trace	6	
Alive and no sign of recurrence —		
One year	1	
One and one half years	2	
Three years	1	
Four years	1	
Four and one half years	2	
Six years	4	
Total		36

POST-OPERATIVE SEQUELÆ —

Suppuration of abdominal incision	5
Cystitis	4
Peritonitis (recovery)	2
Ureteral fistulæ	2
Vesical fistulæ	5
Phlebitis	1
Laceration of rectum (fistula)	1
Pleurisy	1
Rectovaginal fistula	1

These accidents largely occurred in the advanced cases in which the bladder or rectum were so closely involved as to render them almost unavoidable. Unfortunately, one frequently cannot determine before the operation has advanced beyond a point where it is impossible to abandon it, the degree of cancerous extension; consequently all operations for cancer of the cervix must inevitably be attended with greater risks than in any other gynecological disease requiring hysterectomy.

However, in every series of cases thus far reported in which the radical operation has been employed, the surgical mishaps and post-operative sequelæ of greater or lesser extent have been relatively much larger than in the reports of simple hysterectomy cases.

CANCER OF FUNDUS

Merely for the sake of comparison, I include a series of thirteeen cases of cancer of the fundus operated upon by a simple hysterectomy. As a rule, we have made no attempt to effect a wide dissection of the parametrium, and have not removed the iliac glands. The difference in results between cancer of the fundus and of the cervix is so startling as almost to persuade us that they are of an entirely different nature, for one, even when quite extensive, may be permanently cured by a simple hysterectomy, whereas the other may quickly recur, even when it but lightly involves the cervix, even after the most radical removal. We therefore expect good results from comparatively simple operative measures with the one, while the other gives us our worst surgical records.

CANCER OF FUNDUS

Total number of cases	13
Operative death (This patient died one week after operation from a general metastasis of chorio-epithelioma. Death occurred from widespread involvement of the lungs with the malignant process)	1
Well over six years	5
Well over four years	1
Died after five years from recurrence	2
Died from continuance of disease in seven months	1
Died from recurrence in three years	1
Died from recurrence in one year	1
Died in two and one half years from mastoid abscess (Complete autopsy revealed no microscopic trace of cancer either in pelvis or in the abdominal lymph glands)	1

As my cases stand, they prove little or nothing. Certainly, they do not offer substantial argument for a radical operation as I have performed it; for, in my list of cases, only four are alive after the five-year period. One might favor the proposition that, of the six lost sight of, a proportion at least may have survived. This would be mere guesswork, and I accept the standard set by our

German confrères that the cases not accounted for cannot be utilized for statistical study. To count all lost cases against the operation is, however, hardly fair; for, it is impossible in this country to trace a more or less nomadic population, which has no police or other permanent registration.

There has been a primary mortality of a fraction over 8 per cent, which argues in favor of a less radical operation than that of Wertheim, whose mortality has been much higher, and yet Zweifel, from whose experience I have already quoted, had in his series of cases only eight and one half per cent mortality, but claims, nevertheless, a greater percentage of cures than Wertheim. I willingly grant that Wertheim has been more consistently radical than I, for I have varied the details of my technique, always with a hope of keeping the primary mortality within reasonable limits, and yet effecting a sufficiently wide extirpation of vagina and parametrium.

These cases at least prove conclusively one point, and that is, there is no middle-of-the-road policy. Either the operation must be extremely radical, with a considerable primary mortality and many distressing sequelæ with a larger number of ultimate cures among the survivors, or, on the other hand, it must be a much simpler technique, with a minimum primary mortality, few sequelæ, and a much smaller curative basis.

So far as my own experience is concerned, I may say as did von Rosthan that I am neither elated nor yet depressed in my failure to achieve better results. Certainly, the modern American surgeon has no reason to grant that his continental colleagues possess superior skill or a better technique than is in vogue here. Possibly a greater concentration of material in a smaller number of large university clinics may give a wider experience among a few skilled operators, and the earnest educational propaganda among the laity in Germany and Austria concerning the early signs of cancer may cause a larger number of patients to consult the surgeon in the earlier stage of the disease. As the matter now stands, the combined statistics favor the further trial and perfection of this principle among those who are well prepared to carry it out in the most skillful manner.

From a review of the literature and from personal experience, I would offer the following summary concerning the radical operation:

1. The operation, in expert hands, notwithstanding its high primary mortality, has given the greatest percentage of permanent cures of any therapeutic procedure thus far suggested for cancer of the cervix.

2. While the above conclusion is true, the general adoption of the operation, in view of its dangers and difficulties, is not to be advised until the primary mortality can be reduced to a much lower percentage by a simplification or perfection of details.

3. The abandonment of the extensive glandular dissection is justified, because this detail adds to the hazards and does not sufficiently raise the percentage of permanent cures.

4. The cardinal advantage of the operation lies, first and above all, in the excision of an extensive cuff of vagina and the widest possible removal of the parametrial tissue.

5. There is no middle-of-the-road policy in cancer of the cervix. The surgeon would better perform a simple vaginal hysterectomy or a high amputation of the cervix with extensive cauterization than to attempt the radical operation if he is not prepared effectively to execute its details.

6. The earnest endeavor by many specialists, with the improved ultimate cures in a few hands, offers the hope that a further simplification and perfection of details in this operation may yet make it more generally available.

CASES OF CANCER OF THE CERVIX OPERATED UPON BY THE MORE RADICAL ABDOMINAL HYSTERECTOMY IN THE GYNECOLOGICAL CLINIC OF THE UNIVERSITY OF PENNSYLVANIA

No. 34. Case 1. 12–13–1899. 32 years; married 7 years. No para. One miscarriage. Uterine colic with metrorrhagia. *Examination.* Epithelioma of cervix. *Operation.* Curettage and cauterization of cervix followed by panhysterectomy six days later. *Convalescence.* Abdominal incision opened and began to discharge and remained open for one month. Wound then closed with silkworm gut. Later passed small gauze pad by rectum. Following this, rapid convalescence. *Result.* Discharged 4–14–00. Died two years later from local recurrence.

No. 125. Case 2. 6–6–00. 35 years; married 17 years. 1 para. Irregular flow for last two years, excessive for last year. For last month or more had profuse hæmorrhage with excessive malodorous discharge. *Examination.* Cauliflower carcinoma, limited to the cervix on the right side but has extended into the vaginal fornix on the left. Uterus freely movable. *Operation.* Hysterectomy, combined abdominal operation following radical plan of Wertheim and Werder; cuff of vagina removed. Glands not palpable. *Convalescence.* Severe cystitis following operation. *Result.* Patient lived until 6–29–02, more than 2 years, dying of exhaustion. Suffered intense pain. Severe cystitis and suppression of urine.

No. 199. Case 3. 10–29–00. 63 years; married. *Examination.* Carcinoma of uterus, outlet senile and greatly relaxed. Cervix patulous, cauliflower growth. Fundus of uterus normal in size and position. *Operation.* Panhysterectomy. *Convalescence.* Peritonitis. *Result.* Died 10–31–00.

No. 334. Case 4. 45 years; married (history incomplete). *Examination.* Carcinoma of cervix extending into broad ligaments. *Operation.* Hysterectomy. Too far advanced for any hope of cure. *Convalescence.* 6–20–01 embolic pneumonia. 6–27–01 breakdown in entire incision; stitch abscess and malodorous vaginal discharge. *Result.* 7–25–01 discharged. Abdominal wound entirely healed. Apparently in good general condition. Not traced.

No. 384. Case 5. 9–19–01. 39 years; married 19 years. 3 para. Profuse bleeding with malodorous discharge. *Examination.* Early carcinoma of cervix, cauliflower type. *Operation.* Radical hysterectomy. *Convalescence.* Stormy convalescence, peritonitis. Recovery. *Result.* Patient alive over 6 years from time of operation.

No. 420. Case 6. 10–27–1. 36 years; married 15 years. 2 para. 1 miscarriage. Malodorous discharge and menstrual periods have been profuse and too frequent for six months. *Examination.* Cauliflower growth of the cervix. *Operation.* Radical hysterectomy. *Convalescence.* Following operation, pain in right side of abdomen, and right kidney greatly enlarged and easily palpable. *Result.* 12–14–01 discharged with a urinary fistula; gives her a burning sensation. Unable to locate patient.

No. 632. Case 7. 6–23–02. 40 years; no history. *Examination.* Extensive ulcerative growth of cervix. Parametrial involvement. *Operation.* Hysterectomy. Large lymph gland removed. *Result.* Could not be traced.

No. 671. Case 8. 8–20–02. 54 years; widow; married 20 years. No para. No miscarriages. General pain in lower abdomen. Painful micturition. *Examination.* Adenocarcinoma of cervix. *Operation.* Panhysterectomy. *Result.* Death on second day after operation from general peritonitis (8–27–02).

No. 706. Case 9. 9–29–02. 44 years; married 19 years. 3 para. Bleeding constantly for a month. Felt weak and had fainting spells. *Examination.* Carcinoma of cervix with hydrosalpinx. Early case. *Operation.* Cauterization of cervix, and panhysterectomy (10–11–02). *Convalescence.* Uneventful. *Result.* Discharged 11–7–02 perfectly well. 6–24–04 hard mass in right iliac region. Patient died 2 years after operation from general metastasis.

No. 731. Case 10. 10–29–02. 37 years; married 5 years. 1 para. Flow became irregular 6 months ago. Later profuse hæmorrhage. Malodorous. *Examination.* Cauliflower cancer of cervix. *Operation.* Hysterectomy. Glands palpable in left iliac region. *Convalescence.* Stormy; suppuration of abdominal wound. Establishment of ureterovaginal fistula, closed after patient returned home. *Result.* Patient died 12–23–03, extension of cancer into bladder.

No. 907. Case 11. 5–11–03. 41 years; married 20 years. 4 para. Pelvic pain for three years, very severe on walking. Pains down left thigh and leg, diagnosed as rheumatism. Recently hæmorrhage from uterus, light red in color. *Examination.* Cervix large and soft with friable mass. Tenderness and induration along left broad ligament. *Operation.* Panhysterectomy. *Convalescence.* Uneventful. *Result.* Discharged 6–11–03. 1–2–04 all symptoms have disappeared and she feels much better. No recurrence after six years.

No. 1060. Case 12. 10–20–03. 47 years; married 28 years. 6 para. No symptoms up to three months ago when patient began to have free bleeding. *Examination.* Carcinoma of the cervix. *Operation.* Hysterectomy. Removal of considerable area of parametrium. One pelvic lymph gland removed from the right iliac region. *Result.* Patient died in 6 months from internal metastasis. No local recurrence.

No. 1167. Case 13. 2–29–04. 26 years; married 9 years. 1 para. Offensive discharge for last 7 years. No significant change in periods. *Examination.* Preliminary excision of cervical lip. Microscopical examination shows carcinoma of cervix. *Operation.* Panhysterectomy 10 days later. No evidence of metastasis; glands not palpable. *Result.* Patient died in three days of fulminating peritonitis.

No. 1247. Case 14. 6–26–06. 45 years; married 25 years. 3 para. For the last 10 months constant irregular bleeding. Great weakness from loss of blood. *Examination.* Very early carcinoma of the cervix, which had not extended to surrounding area. Uterus enlarged to size of 2 months' pregnancy. Seat of fibroid. *Operation.* Hysterectomy. Extensive area of vaginal involvement but no extension into broad ligaments. Pelvic glands not palpable. *Convalescence.* Normal. *Result.* Present date, patient alive and well since the operation.

No. 1379. Case 15. 12–13–04. 42 years; married 10 years. For 6 months periods have occurred every 2 weeks. *Examination.* Large cauliflower

mass springing from lip of cervix. No induration of parametrium. *Operation.* Preliminary cauterization, followed immediately by abdominal hysterectomy. Right angle clamps of Wertheim employed in this operation. *Convalescence.* Infection of stump following operation. Vesicle fistula for a short time, healed before leaving hospital. *Result.* Patient could not be located. Traced to two addresses and then lost sight of.

No. 1700. Case 16. 1–11–06. 53 years; married 33 years. 7 para. Blood-tinged leucorrhœa of two months duration. *Examination.* Cervical carcinoma. *Operation.* Panhysterectomy. *Convalescence.* Tympanitis; intestinal paresis; vomiting with marked leucocytosis. Suppuration of wound. *Result.* Discharged 2–18–06, general condition excellent, 4–17–10 (note) patient died from general metastasis 18 months later.

No. 1908. Case 17. 8–31–06. 47 years; married. 2 para. Excessive uterine bleeding. *Examination.* Carcinoma of cervix, completely destroying cervix. *Operation.* Hysterectomy. Apparent metastasis to sigmoid flexure, possibly may be inflammatory. *Convalescence.* Very stormy. Severe peritonitis. Intense cystitis. Patient in hospital 40 days. *Result.* Her physician writes that she left his care, and he has been unable to trace her since.

No. 1976. Case 18. 11–4–06. 49 years; married 23 years. 1 para. Failing health for 2 years. Vaginal discharge constantly for 5 months. Lost 40 lbs. in weight. *Examination.* Carcinoma of uterus. Bleeding on examination from extensive crater of cervix. *Operation.* Panhysterectomy. *Convalescence.* Uneventful. *Result.* Discharged, 12–27–06 perfectly well. Patient died 15 months later from internal metastasis.

No. 2059. Case 19. 2–1–07. 49 years; married 30 years. 3 para. Constant pain in lower left quadrant of the abdomen extending to knee. Leucorrhœa constant. Scanty bleeding spells in last 4 years. *Examination.* Cervical carcinoma. *Operation.* Panhysterectomy. Rectum punctured during operation. Immediately repaired. *Convalescence.* Phlebitis. *Result.* Discharged 3–23–07. Physician reports patient alive and well.

No. 2267. Case 20. 2–16–07. 42 years; married 9 years. No para. One miscarriage. Treated with tampons for three months. Always bleeds after removal. *Examination.* Localized cauliflower carcinoma of cervix. Extension into broad ligaments. *Operation.* Panhysterectomy. *Convalescence.* Rapid and uneventful. *Result.* Discharged 10–11–1907. Died 2 years later of local recurrence.

No. 2390. Case 21. 1–27–08. 37 years; married 18 years. 2 para. Profuse bleeding 8 weeks ago. Since then continuous discharge with trace of blood. *Examination.* Part of cervix has sloughed away. Uterus movable; broad ligaments free. *Operation.* Extensive cervical cauterization, followed immediately by radical hysterectomy. *Result.* 5–1–12 patient alive and well, physician's report.

No. 2755. Case 22. 12–4–08. 41 years; married 18 years. 2 para. Excessive leucorrhœa for last six months, varying from white serous to coffee-colored discharge. *Examination.* Early carcinoma of cervix. No extension to vaginal wall or parametrium. *Operation.* Radical hysterectomy. No palpable glands. *Result.* 5–25–12 no recurrence. Patient in excellent health.

No. 2758. Case 23. 12–9–08. 45 years; married 25 years. 8 para. Six months, watery discharge. *Examination.* Extensive cauliflower carcinoma, involving entire cervix. *Operation.* Hysterectomy. *Convalescence.* Infection of severe grade around vaginal wound. *Result.* Died 1 year later, local extension.

No. 2835. Case 24. 2–12–09. 50 years; married 20 years. No para. Hæmorrhage two months, yellowish malodorous leucorrhœa for three months. *Examination.* Cervix extensively ulcerated, bleeds freely on touch. Large cauliflower mass filling vaginal fornix. Two fibroid tumors of fundus uteri. *Operation.* Preliminary curettage and application of formaline, followed immediately by hysterectomy. Extensive intestinal adhesions. Cancer extended too far for radical operation. *Convalescence.* Intense suffering from cystitis and rectovaginal fistula. Extensive suppuration of abdominal incision. *Result.* Died six months later.

No. 2952. Case 25. 5–24–09. 52 years; married 21 years. 3 para. Irregular hæmorrhage 2 years; very profuse for last three months. *Examination.* Preliminary curettage, excision of cervical tissue for diagnosis, adenocarcinoma of cervix. *Operation.* Complete abdominal hysterectomy. One enlarged pelvic lymph gland removed. *Result.* 5–1–12 in excellent health. No evidence of recurrence.

No. 3074. Case 26. 10–9–09. 48 years; married 31 years. 5 para. Yellowish malodorous discharge, 3 months. *Examination.* Cancerous ulceration of cervix. Uterus enlarged and slightly fixed in pelvix. *Operation.* Abdominal hysterectomy. Extension of cancer along uterosacral ligaments. Glands not palpable. Adrenalin and formalin packing around vaginal wound. *Result.* Patient died 8–28–10, internal metastasis. Severe pain. Vesical fistula developed some time before death.

No. 3081. Case 27. 10–17–09. 43 years; married 21 years. 2 para. Losing weight for 2 years. Almost continuous bleeding for four months. *Examination.* Cauliflower mass filling vagina, and extensively involving cervix. *Operation.* Abdominal hysterectomy. Wide extirpation of uterus. Adrenalin-formalin packing in vaginal vault. Glands not palpable. *Result.* Could not be traced.

No. 3133. Case 28. 12–5–09. 48 years; married 26 years. 2 para. Profuse discharge with bloody tinge. *Examination.* Carcinoma of cervix. *Operation.* Panhysterectomy. *Convales-*

cence. Bladder irritability. Malodorous discharge from vesicovaginal fistula. *Result.* 1–3–10 discharged. Fistula persisted for 6 months, later intestinal fistula developed through abdominal scar. Died from general peritoneal metastasis 18 months after operation.

No. 3191. Case 29. 2–6–10. 50 years; widow. 2 para. No miscarriages. Malodorous discharge of two or three months' duration. Frequency of urination. Loss of weight and strength. *Examination.* Carcinoma of cervix. *Operation.* Panhysterectomy. *Convalescence.* Pleurisy. *Result.* Discharged 3–10–10. No bladder irritation, but complained of severe backache. Died one year later of internal metastasis.

No. 3392. Case 30. 8–3–10. 24 years; married 8 years. 4 para. Whitish thick discharge for one year. Hæmorrhage daily for 7 weeks. *Examination.* Carcinoma of cervix (interstitial). *Operation.* Complete hysterectomy. *Convalescence.* Uneventful. *Result.* 4–20–12 physician reports patient alive. "She is fat, feels well and does all of her own housework." No evidence of recurrence.

No. 3566. Case 31. 1–27–10. 36 years; married 18 years. 7 para. For six months, hæmorrhagic discharge with yellowish leucorrhœa. *Examination.* Extensive cancerous involvement of cervix. Parametrial involvement. *Operation.* Hysterectomy, extension to bladder. Several iliac glands removed. *Convalescence.* Extensive lymphatic metastasis. *Result.* 5–19–12. Extensive recurrence; intense pain, requires morphine in large doses.

No. 3596. Case 32. 1–17–11. 40 years; 1 para. Yellowish discharge and profuse irregular flow, 6 months. *Examination.* Cauliflower carcinoma, involving both cervical lips; parametrium slightly involved. *Operation.* Preliminary cauterization. Hysterectomy. *Result.* No symptoms of recurrence.

No. 3603. Case 33. 1–23–11. 64 years; married 15 years 4 para. Severe pain in lower abdomen. Continuous oozing of blood. Pain in rectal area. Marked loss in weight and strength. *Examination.* Carcinoma of cervix. Extensive involvement of cervix and broad ligaments. *Operation.* Panhysterectomy. *Convalescence.* Uneventful. Cystoscopic examination showed vesico-uretero-vaginal fistula. *Result.* Discharged 3–6–11. Vesico-uretero-vaginal fistula persisted. Repaired one year later; 18 months later extensive recurrence, death from large vesical hæmorrhage.

No. 3611. Case 34. 1–30–11. 52 years; married 27 years; 4 para. Since menopause, 8 years ago, vaginal discharge, profuse hemorrhage 8 weeks ago. *Examination.* Early carcinoma of cervix. No palpable parametrial involvement. *Operation.* Preliminary cauterization. Hysterectomy. Gland not palpable. *Result.* 4–26–12. Well, no evidence of local recurrence.

No. 3753. Case 35. 5–22–11. 40 years; married 13 years. 2 para. For 6 months periods have been much more profuse and more prolonged. *Examination.* Ulcerative crater, involving both lips of cervix, not extensive. No palpable extension to parametrium. *Operation.* Preliminary cauterization. Hysterectomy. Extension to lymph glands and both iliac fossæ. One or two glands removed. Showed metastasis. *Result.* Died 11–11–11. Cancer recurred, invaded bladder and rectum. Intense pain in iliac region.

No. 3818. Case 36. 8–24–11. 40 years; married 6 years. 3 para. Symptoms for 8 weeks. *Examination.* Early carcinoma of cervix, not extending to vagina or into broad ligaments. *Operation.* Complete abdominal hysterectomy. *Convalescence.* Uneventful. *Result.* Well, with no sign of recurrence, 4–27–12.

CARCINOMA OF FUNDUS, SIMPLE ABDOMINAL HYSTERECTOMY

No. 3279. Case 1. 4–13–01. 42 years; married 20 years. 4 para. Periods every two weeks and very profuse. Time of bleeding increased from 7 to 10 days; passed many clots. *Examination.* Myoma uteri with carcinoma of cervix. *Operation.* Supravaginal myomectomy and bilateral salpingectomy; left oöphorectomy and appendectomy. *Convalescence.* Uneventful. *Result.* Discharged 5–4–10 with a low-grade phlebitis of the left leg. Patient well over six years after operation.

No. 522. Case 2. 3–4–02. 40 years; married 22 years. 3 para. 9 months ago began to have severe uterine bleeding, which continued up to the present time. *Examination.* Uterus enlarged. On curettage, large amount of brain-like tissue removed. Carcinoma of fundus. *Operation.* Simple hysterectomy. *Convalescence.* Satisfactory. *Result.* Present date, patient alive and in good health.

No. 924. Case 3. 5–26–03. 50 years; single. Symptoms not given. *Examination.* Carcinoma of fundus. *Operation.* Abdominal hysterectomy. *Convalescence.* Uninterrupted. *Result.* Patient living and well.

No. 1072. Case 4. 11–9–03. 55 years; married 31 years. 1 para. No abnormal menstrual symptoms up to 55 years. Large ovarian cyst indication for operation. *Examination.* Cancer of the fundus was found on pathological examination. *Operation.* Simple hysterectomy. Removal of ovarian cyst. *Convalescence.* Normal. *Result.* Present date, patient well; no recurrence.

No. 1131. Case 5. 1–25–04. 56 years (history incomplete). Bilateral pain in the lumbar region. Frequency of urination. *Examination.* Carcinoma of fundus. *Operation.* Complete hysterectomy. *Convalescence.* Abdominal distention; nausea; vomiting. *Result.* Discharged 2–22–03 in good condition. Died three years later of local recurrence.

No. 1524. Case 6. 5–17–05. 43 years; married 23 years. No para. Last two months has had profuse hæmorrhage. Has lost greatly in weight. Severe degree of anæmia. *Examination.* Uterus enlarged; cervix normal. Curettage shows friable material, undoubtedly cancer. Interstitial cancer.

Operation. Hysterectomy. *Convalescence.* Normal. *Result.* 6–1–1912, patient alive and well.

No. 1609. Case 7. 10–3–05. 55 years; married. Slight leucorrhœa and dribbling of blood for a year. *Examination.* Carcinoma of fundus extending to sigmoid flexure. *Operation.* Panhysterectomy. *Result.* Well up to 10–3–11, when she noticed hæmorrhage from the bowels. Died from general carcinomatous metastasis. Had passed five-year period when recurrence occurred.

No. 1954. Case 8. 10–8–06. 52 years; married 12 years. 3 para. Irregular bleeding for nine months. Vaginal discharge for one year. Prolonged periods. *Examination.* Cervix intact; uterus enlarged; freely movable. Curettage shows carcinoma of fundus. *Operation.* Panhysterectomy. No involvement of lymph glands. *Result.* Recovery before she left ward. Patient well and doing heavy work 10–1–11, when there was a recurrence. Died from suppression of urine. Had just passed five-year limit when recurrence occurred.

No. 1433. Case 9. 1–11–05. 31 years; married 14 years. 7 para. Vaginal bleeding for three weeks, with chills. *Examination.* Chorio-epithelioma of uterus. Relaxed vaginal outlet. Cervix soft, uterus enlarged. *Operation.* Panhysterectomy. *Convalescence.* Dyspnœa, pain in chest with cough. Physical signs in chest negative. Rusty sputum; cardiac murmur over apex. *Result.* Died within week after operation. Postmortem examination showed general metastasis.

No. 2189. Case 10. 7–3–07. 40 years; single. *Examination.* Myoma uteri with cancer of fundus. *Operation.* Partial hysterectomy. Impossible to remove cancerous metastasis. *Result.* Died 7 months later, continuation of disease.

No. 2983. Case 11. 6–15–09. 55 years; married 14 years. 3 para. More or less constant bleeding for a year. *Examination.* Extensive cancer of fundus. Metastasis to broad ligaments. *Operation.* Abdominal hysterectomy. Wide excision of parametrium, but cancerous tissue appeared to have passed beyond border lines of operation. *Result.* Patient died 10–26–10. General metastasis. Extensive local recurrence. Severe pain. Cystitis. Suppression of urine.

No. 3121. Case 12. 11–23–09. 40 years; married 20 years. 1 para. Irregular hæmorrhage for one year. Cramp-like pains referable to gall-stones. *Examination.* Carcinoma of fundus with slight cancerous involvement of vagina. *Operation.* Hysterectomy. Only slight area of cancer in fundus. *Result.* 4–25–12. Well, examination shows no evidence of recurrence.

No. 3144. Case 13. 12–16–09. 56 years; single. Yellow leucorrhœa with profuse uterine hæmorrhage. Marked loss in weight in last year. Constant backache; epigastric pain. *Examination.* Carcinoma of fundus. *Operation.* Panhysterectomy; dilatation and curettage showed large piece of friable material. *Convalescence.* Uneventful. *Result.* Discharged 1–13–10. 5–1–12 patient died of acute cerebrospinal meningitis. Autopsy revealed no microscopic trace of cancer.

THE RADICAL OPERATION FOR CANCER OF THE UTERUS[1]

By THOMAS S. CULLEN, M. B., Baltimore

THE early recognition in recent years of cancer of the body of the uterus, and, as a consequence, the complete removal of the uterus, has led to such excellent temporary as well as permanent results that a consideration of this variety of cancer of the uterus is at this time entirely unnecessary. Some operators claim that nearly all of these patients are permanently cured of their cancer, and a most conservative estimate would be that fully two thirds of all cases of cancer of the body of the uterus operated upon never show any further manifestation of the disease. This fact is often lost sight of in the gloomy reports frequently published on the final results in cancer of the uterus. The diagnosis in the majority of the cases of cancer of the body of the uterus has been made from scrapings, and from them the diagnosis is rendered certain in the incipient stage of the disease. In no other branch of surgery has the value of the microscope as an aid to the surgeon been more signally demonstrated. In the present address, therefore, I shall limit myself to a consideration of cancer affecting the cervix.

CANCER OF THE CERVIX

Before considering the immediate and end results in the radical operation for cancer of the cervix, permit me to outline the salient points in our operative treatment of these cases.

Operability. It is very difficult to ascertain the percentage of cases that are suitable

[1] Read before the Third Clinical Congress of Surgeons of North America, New York City, November 14, 1912.

for operation. Many patients never see a physician until the disease is too far advanced for any radical operation, and often it happens that the surgeon is not even called upon to see the patient. Again, as pointed out very clearly by Taylor, numerous far advanced cases of cancer of the cervix are seen in the dispensaries, and only a minority of these reach the operating room.

When the cervix is freely movable, we consider the case operable; and although the growth may have extended to the vaginal wall, and even if the broad ligament on one side shows diminished mobility, provided the patient is in a fair physical condition, the abdominal operation is considered justifiable.

Before declining to operate, it is, as a rule, advisable to examine the patient under an anæsthetic, as one is occasionally able to detect that the lateral thickening is due, not to an extension of the cancer, but to a coincident inflammation of the tube and ovary. This we have noted on several occasions, and Taylor has recently drawn attention to this point.

TECHNIQUE OF THE OPERATION

I have never performed a vaginal hysterectomy for cancer of the cervix, but would not hesitate to do so were I dealing with a very stout patient suffering from a carcinoma of the cervix, associated with marked prolapsus.

Preparatory treatment of the cervix. In some of the cases, we have cauterized the cervix thoroughly and then abstained from all local treatment for a week, thus giving the raw area a chance to contract down. In some instances, this procedure has been followed by a marked "loosening up" of the cervix, and the uterus, which, prior to the cauterization had apparently been somewhat fixed, in the course of a few days had become freely movable. On the other hand, I have noted that some patients take a second anæsthetic within seven or eight days very badly; and so much have I been impressed with this fact that for several years I have, whenever possible, done the cauterization only just prior to opening the abdomen.

My colleagues at the Johns Hopkins Hospital, at the present time, after cauterizing the cervix and washing out the vagina, flush it out with an iodine and alcohol solution (iodine 3.5 per cent). When this is removed, the vagina is filled with alcohol. After this in turn has been removed, the vagina is thoroughly dried and is then filled with gauze. This method has proved to be most satisfactory.

ABDOMINAL HYSTERECTOMY

The operation is patterned after that described by Wertheim. Good exposure of the field of operation is absolutely necessary to secure a thorough removal of the diseased structures. When the patient is very stout, a transverse wedge of skin and fat down to the fascia may be removed, and the abdomen then entered through a longitudinal incision. This procedure greatly reduces the depth from the surface to the floor of the pelvis, and materially cuts down the time consumed in the operation.

In quite a number of the cases, we have employed an electrically heated table throughout the operation, and it has seemed to me that these patients left the table in a much better condition than the average patient after hysterectomy for cancer.

Proper illumination is of great importance in this operation, and we have found the Krönig light of much value in flooding the field of operation with a steady and most satisfactory flow of artificial sunshine. This light is a great adjunct to any operating room.

As many of the patients are weakened by the long standing hæmorrhage and discharge, I try to save the strength as much as possible by not placing the woman in the Trendelenburg posture until the pelvis has been carefully walled off and the operator is ready to expose the ureters.

As a rule, I have found no difficulty in locating and isolating the ureters except in very stout persons. Here the peritoneum appears to be excessively thin, while the underlying fat is correspondingly thick, and the small blood-vessels in the fat tear on the slightest traction. When the patient is thin, I rarely encounter much trouble until the vaginal veins to the outer side of and below the ureter are reached. These are usually readily controlled with the long Wertheim forceps, but

now and then give rise to alarming bleeding. Occasionally, prior to cutting across the vagina, I apply the right-angle Wertheim clamps, but usually, after doubly walling off the uterus from the pelvic wall, and having had an assistant wipe out the vagina until the pledgets come away free from stain, I cut across the vagina, picking up the vaginal margins with Ochsner clamps.

After all oozing from the vaginal margins has been controlled the bladder peritoneum is tacked to the edge of the mucosa of the anterior vaginal wall. Thus, as the bladder distends, it is the peritoneally covered area that ascends, and no raw surface is left to ride over any drain that may be left.

In some of the cases I have removed the pelvic glands, in others I have not disturbed them. Many of my patients were much exhausted by the operation, and I felt that any further time expended in manipulation in the abdomen would seriously jeopardize the patient's life. In 1900, in my book on cancer of the uterus, I drew attention to the fact that an enlarged gland did not necessarily indicate cancer, inasmuch as the enlargement might be due to septic absorption from the cervix. Peterson, in his series, removed the glands in 29 cases, and in 5 of these found metastases. Of the 5 patients, one died after operation, 3 had a recurrence, and one was well after 3 years. Whether the glands are to be removed or not must depend on the condition of the patient, and must be left to the judgment of the individual operator.

Closure of the pelvis. After the bladder has been attached to the anterior vaginal wall and the posterior vaginal wall to the rectum, the broad ligaments are closed. If all oozing has been completely checked, a small cigarette drain is laid in the pelvis and brought out through the vaginal opening, which is now not over 1.5 cm. in diameter. Where there is a little oozing in one or both broad ligaments, I have occasionally placed a cigarette drain in the lower angle of each broad ligament, bringing the ends out into the vagina.

Duration of the operation. When the carcinoma of the cervix is in an early stage, the patient is not likely to have lost much blood, and, as little sloughing has occurred, there has been a minimal amount of septic absorption. In such cases the operation is a relatively easy one. In the far advanced cases the patient is frequently cachectic as a result of the anæmia and the absorption of septic products. In these cases the growth often extends alarmingly close to the ureter, and as a result the dissection is slow. This prolongation of the operation in a patient already greatly weakened by the disease often leads to an alarming collapse before the operation is completed. Such a patient will stand the operation relatively well for from one to one and a half hours, and then suddenly collapse. A Wertheim operation, at best, is one of the most difficult of all the abdominal procedures; consequently the operator needs to be in the best possible physical condition. He should make it his first operation of the day, and preferably perform it early in the morning, when he is fresh. Stimulation of the patient should be undertaken, even before there are the slightest signs of collapse.

When the cervix has been torn across during removal of the uterus, thus materially increasing the danger of peritonitis, I occasionally place an abdominal drain in the lower angle of the incision, in addition to the one emerging from the vagina. In these cases we place the patient in the Fowler position immediately after the operation, if the pulse will permit.

RESULTS IN THE RADICAL ABDOMINAL OPERATION FOR CANCER OF THE CERVIX

When the Committee of the American Gynecological Society met in Baltimore to arrange the program for its annual meeting, which was held in May of this year, it was unanimously agreed that the time had arrived when we should take stock of the results of abdominal hysterectomies for cancer of the cervix in America. The results of some of these labors are to be found in SURGERY, GYNECOLOGY AND OBSTETRICS for August, 1912. That number of the journal includes interesting articles by Peterson, Taylor, and Taussig.[1] At the meeting, Graves

[1] Dr. John G. Clark of Philadelphia, Dr. J. Sampson of Albany, and several others also briefly reported their results in the radical operation. Dr. Clark's paper appears on p. 255 of this issue; Dr. Sampson's on p. 303.

reported the results of his work in Boston and Peterson gave his statistics from Ann Arbor, Taylor sent out circular letters to about 175 operators in New York, Brooklyn, and Philadelphia. In his paper he says, "The replies which I received did not give me any information along the line that I wished, and I have not been able to deduce from them anything of value as to the ultimate result of cancer operations in these two states." He learned, however, two things: first, the entire absence of reliable statistics among the operators; second, the universal feeling among the surgeons that the patients were not seen early enough to be permanently relieved.

Taylor then reports his own results. His immediate mortality was only 3 in 28 cases. Unfortunately many of his patients were lost track of, so that he could not determine the relative percentage of permanent recovery.

Taussig communicated with surgeons west of the Mississippi River. In all, he collected records of 60 patients; only 14 of these operations dated beyond the five-year limit. He says, "By a strange coincidence, there was not a single operative mortality among these first 14 patients. Apparently, each operator was particularly careful in the selection of his first cases." Of the 14 patients, one could not be traced and one had died of an intercurrent disease. Of the remaining 12 patients, 5, or 41.6 per cent of these, were still free from recurrence. This is an exceptionally good showing, even though the numbers be small.

Neel,[1] after much labor, was able to trace the records of the cancer cases operated on by the radical method at the Johns Hopkins Hospital. These operations were performed by Dr. Kelly and his associates, and by the residents during the various years. Neel reported, in all, seventy cases in which over five years had elapsed since the radical operation had been performed. There was an immediate mortality of 20, or 28.6 per cent. Of the 50 patients leaving the hospital, nine had been lost track of, and one had died two years later of pneumonia; 14, or 20 per cent of the total number of patients, are to-day free from recurrence, and the remainder had died with unmistakable evidence of return of the growth. Neel draws attention to the fact that, if we deduct the 20 that died immediately and discard the patient dying of an intercurrent affection, and also subtract the nine cases that were lost track of, he still has 40 patients that survived the operation, and concerning whom he has definite data. Fourteen, or 35 per cent of the 40 patients, are still alive.

[1] Dr. Neel's paper appears in this issue, on p. 292.

At the request of the Committee of the American Gynecological Society, I was asked to find out to what extent the radical abdominal operation was employed for carcinoma of the cervix in the Southern states. Letters were sent out to most of the surgeons in the South, and I take this opportunity of thanking the many who took the time and trouble to reply. The majority had never done a Wertheim operation; a few had performed it two or three times, and had lost sight of the patient. Only in a few instances were the statistics of any value to us, either because the operation was of such recent date or because the patient could not be traced.

Under date of April 6, 1912, Dr. George Tully Vaughan of Washington writes: "In reply to your letter asking for data of Wertheim or other abdominal hysterectomies for cancer of the cervix, I should say that I have not had a large experience in gynecological work. About five complete abdominal operations for cancer are all I can muster — one death and the others still living, so far as I know. One, at least, was heard from recently, three years after the operation."

Dr. H. H. Grant of Louisville, Kentucky, replying under date of April 9, 1912, says: "I have done but seven panhysterectomies for carcinoma, and but two of these included exploration for intra-abdominal glands, none claiming to be Wertheim. There was no immediate mortality. Two of these patients were subjected to amputation of the cervix, because of doubt, and in one, Mrs. L., aged 37 years, reoperation was done after three months for a threatening recurrence in 1900. She died of recurrence ten months after the second operation. The other, aged 41, was reoperated on in three weeks. She died in five months, of recurrence The other five

cases are still living. Mrs. W., aged 54, operated on November, 1909, well; Mrs. B., aged 47, operated on in February, 1910, well; Mrs. M., aged 51, operated on in April, 1911, well; Mrs. C., aged 42, operated on in March, 1910, suspicious; Mrs. M., aged 48, operated on in December, 1911, well."

Dr. J. Mason Hundley of the University of Maryland has had quite a number of permanent cures, and is a most enthusiastic advocate of the radical operation. Under date of November 1, 1912, he writes: "I find we have records of 21 radical operations for cancer of the cervix done by me since 1905. Of that number, 2 died as a result of the operation and one died after reaching home. Four are living and apparently well: one operated upon about six years ago, three between seven and eight years; and one is now dying, operated upon three years ago. Three are living after two years. The remainder have been lost track of."

At the meeting of the American Gynecological Society, I reported my results in 49 cases in which a complete abdominal hysterectomy was attempted. As noted from the accompanying table, brought up to June 1, 1912, there were 11 immediate deaths, a mortality of 23 per cent; 3 patients were lost track of, and are accordingly included among the dead; 21 died at periods varying from a few months to six years. Fourteen were living and apparently well at the time of the meeting.

Some of the deaths were due to uncontrollable venous oozing, others to shock due to hæmorrhage or to the greatly weakened condition of the patient, others to renal complications, and, in a few instances, to a localized purulent peritonitis. In the tabulation of remote deaths, it will be noted that in some it was clearly evident at the time of operation that the entire growth had not been removed. The death in nearly all of these cases was due to a continued progress of the disease.

Five-year limit. Twenty-six of my cases were operated on over five years ago. Of this number, seven died while the patient was still in the hospital. One of the patients was lost track of. Eleven died at periods varying from a few months to six years, and seven, or 26.9 per cent, are well to-day.

1 is well 6½ years after operation.
1 is well 8 years after operation.
1 is well 8 years and 4 months after operation.
1 is well 8 years and 6 months after operation.
1 is well 9 years and 8 months after operation.
1 is well 9 years and 10 months after operation.
1 is well 13 years after operation.

In three of these cases, the ureters were catheterized prior to opening the abdomen.

The cancer in four of these successful cases was apparently confined to the cervix, the uterus being freely movable. In one case, the growth had extended into the right broad ligament and encroached alarmingly on the ureter.

In one case, the carcinoma had made such extensive inroads on the anterior wall of the cervix that the bladder had become densely adherent to it, and was opened during the dissection.

In the remaining case, the cervix was so extensively involved that, during the operation, the body was almost completely torn away from the cervix, and on examination of the specimen after removal, the carcinoma was found to have extended almost to the cut surface. In this case a most guarded prognosis was given. It is now over eight years and six months since this uterus was removed. I need hardly add that in every case a histological examination was made.

RESULTS OF ABDOMINAL OPERATIONS FOR CANCER OF THE CERVIX [1]

Immediate death, 11 cases —
Richardson, April, 1902.
Tate, July, 1902 (H).
Kyle, October, 1902 (H).
Compton, April, 1903.
Rogers, March, 1905.
Hayward, February, 1906.
Vogelsang, November, 1906 (H).
Havistick, August, 1909.
King, December, 1909 (H).
Pfaff, January, 1910.
Harris, November, 1910 (H).

Not located, 3 cases —
Collins, January, 1905.
Welch, January, 1908 (H).
Owens, February, 1908 (H).

Patients living, 14 cases —
Ryan, June, 1911; 11 months (H).
Carroll, May, 1911; 12 months (H).
Griffith, October, 1910; 18 months.
Lucas, November, 1909; 2 years, 5 months (H).
Heilman, December, 1908; 3 years, 5 months (H).
Sangwin, May, 1909; 3 years, 6 months.

[1] Those marked with (H) I performed at the Johns Hopkins Hospital; the others were done at the other hospitals with which I am connected.

Conklin, June, 1908; 3 years, 8 months (H).
Humphreys, December, 1905.
Herzen, April, 1904; 8 years.
Yerkes, January, 1904.
Brown, August, 1903; 8 years, 6 months.
Wotten, August, 1902; 9 years, 8 months.
Mrs. M., patient of Dr. Geo. H. Carveth, Toronto, December, 1902; 9 years, 10 months.
Ketler, June, 1899, 13 years.

Remote death, 21 cases —
White, April, 1903; partially removed.
Tolley, April, 1903; partially removed.
Bowen, November, 1911; 2 months, uræmia, blindness.
Olfers, April, 1908; recurrence, 3 months (H).
Jones, 1910; died, 6 months (H).
Bozeman, December, 1910; incomplete removal. Died, 6 months.
Snively, June, 1910; died, 6 months.
Finkle, April, 1903; died, 8 months.
Porter, January, 1905; not entirely removed; died, 11 months.
Karr, July, 1906; died, 14 months (H).
Franklin, February, 1908; died, 16 months (H).
Willis, October, 1905; died, 18 months (H).
Mack, February, 1908; died, 19 months (H).
Raymond, January, 1908; died, 21 months (H).
Ferguson, September, 1906; died, 21 months (H).
Trego, January, 1900; lived 2 years.
Baldwin, May, 1907; lived 2 years.
Ardinger, July, 1908; lived 2 years, 10 months (H).
Stehle, May, 1904; lived 4 years.
Riggins, January, 1905; lived 5 years.
Mengel, May, 1904; lived nearly 6 years.

Operated on over 5 years ago; 26 cases —
Immediate death, 7 cases.
Not located, 1 case.
Remote deaths at periods varying from a few months to nearly 6 years, 11 cases.

Living —
7 cases or 26.9 per cent.

PROGNOSIS

Even after removal of the uterus, it is very difficult to give a satisfactory forecast as to the ultimate result. Sometimes a case that seems most favorable shows an early recurrence, while a border-line case that looks most unfavorable may remain free of the disease. When the growth of the cervix is of a glandular type, however, we may look for a speedy return.

An early local return, while most disconcerting, need not necessarily prove fatal. Nearly two years ago, a very competent surgeon in a Southern state did a radical operation, and within a few months a carcinomatous nodule was detected in the vault. In this case, on account of the proximity of the carcinoma to the ureter, I opened the abdomen and isolated the ureters and removed a long cuff of the vagina. This patient, up to the present time, 16 months later, has had no further manifestation of the disease.

Temporary Relief. Some surgeons are of the opinion that, if the entire growth has not been removed, the patients suffer much more than if no radical operation has been performed. In my experience, the patient in the late stages is no more prone to pressure symptoms than is the woman who has not been operated upon. On the other hand, frequently the growth spreads in such a manner that the vaginal mucosa is not again involved, and the patient is accordingly spared the frequent hæmorrhages and the foul-smelling discharge. I am frank to admit that in some cases I would have refrained from operatng had I been aware of the widespread extension of the disease; but sometimes, when tihe growth is not very dense, the extent is only ascertainable when the operator has partially completed his dissection, and complete removal of the uterus cannot then be avoided.

DEDUCTIONS

It is difficult to lay down a hard and fast rule as to what cases should and what cases should not be operated upon. All familiar with the course of this dread disease know that in time the hæmorrhages become very severe, and that later on, in the intervals between hæmorrhages, the patient has a most foul and loathsome discharge, and that in some cases rectovaginal or vesicovaginal fistulæ or both may develop. They also know that the patient becomes a burden to herself and a source of the greatest anxiety to her family, who are powerless to do anything; and, finally, that most painful pressure symptoms may develop. With such an outlook, I feel sure that there is not a man in this audience who, if brought face to face with such a problem in his own family, would not gladly take the chance of an operation, if there were only one or two chances in a hundred; as a matter of fact the chances are infinitely better.

Over a decade ago, when speaking before the Academy of Medicine in this city on the early diagnosis of cancer of the uterus, one of the most distinguished gynecologists of New York, in the discussion, said, if I remember correctly, that he had operated on over 120

cases of carcinoma of the uterus, and that at the time of the meeting not one of them was living.

The splendid results obtained by Wertheim and others in Europe leave no doubt that great strides have been made in the cure of cancer of the uterus, and even from the limited observations in America, it is clear that considerable progress has been made, and there is no reason why we should not materially increase our percentage of permanent cures. The Germans certainly have one advantage over the American surgeons. Many of their patients have had large numbers of children and, owing to their manner of work, have not accumulated the large amount of adipose tissue that is so prevalent with us. Consequently the continental operator can at once secure a much better exposure, and is not troubled with the abundance of adipose tissue around the ureter and in the broad ligament.

The oftener the surgeon performs this operation, the more expert he becomes; the length of the operation is shortened, and consequently the death rate is lowered. The German surgeons apparently see many more of these cases than surgeons in this country. During my last trip to Germany, I was making rounds with Professor Zweifel, in Leipzig, and he told me that in one month he had performed fifteen Wertheim operations for cancer of the cervix. It is, therefore, only natural that the German surgeon should have a lower operative mortality. Again, the continental surgeon has materially profited by the widespread publicity which the cancer problem has received, both in the profession and among the laity.

From time to time attempts have been made in America to start an education of the women of this country to the necessity of reporting any suspicious symptoms at once to their physicians, but, apart from some spasmodic efforts, nothing has really been accomplished. It would be most fitting if this splendid society should here and now start a cancer campaign that would extend from coast to coast. It can and should be undertaken at once. Publications that have done much to enlighten the laity on medical matters could be of invaluable service in the dissemination of this knowledge.

The laity now have a clear idea of the subject of appendicitis, and whereas a decade ago it was often necessary for the family physician, after making the diagnosis, to spend hours in urging the necessity for immediate operation, at the present day, after he has given his verdict, the first question asked by the family is, to what hospital the patient should be sent.

The splendid crusade against tuberculosis is another example of the immense amount that has been accomplished by the education of the rank and file of the community.

Two or three well-illustrated articles, explaining in simple words just what cancer is, how it spreads, and what may be accomplished by early operative interference, will be all that is necessary to put women on their guard. Many of them have an innate fear that they will some time develop cancer of the uterus, and are fully aware of the distressing train of symptoms in the advanced stages of this dread disease. What we want to do is to impress upon them the fact that any abnormal bleeding, no matter how slight, should be immediately investigated by their physician to ascertain if cancer be present. If no malignancy be found, they are relieved of their unnecessary anxiety. If cancer be present, it can be combated in the early stages. The fact that early cancer may be successfully eradicated by operation, and that it is in the beginning a strictly local process instead of a "general blood disease," as it is so often referred to by the laity, should be most forcibly impressed upon the community.

The sooner this subject is launched the sooner will our percentage of permanent cures increase. I feel sure that after women in general are thoroughly familiar with the necessity of an examination just as soon as they present any symptoms, the surgeon will be able to save, at a conservative estimate, from 20 to 25 per cent of these cases.

Among the most important surgical papers that emanate from the larger clinics are those which deal with the after results in various operative procedures, and it is well worth the while of every surgeon to "take stock" at

regular intervals. Having a vivid recollection of the numerous immediate deaths I had encountered following the Wertheim operation, I hesitated long before I could make up my mind to attempt to locate the patients that had left the hospital. But when, finally, the work was commenced, and it was found that some patients had enjoyed comparative comfort for one, two or three, or even six years, I felt that the operation had been worth while. And when seven letters came back saying that the patients were well at periods varying from six to thirteen years, and expressing the most profound thanks for what had been done for them, I could not help feeling that the radical abdominal operation is the one destined to yield the best results.

This is an operation, however, that cannot be lightly undertaken, as it requires the very best efforts of the surgeon. My friend, Reuben Peterson, has expressed my sentiments so well that in conclusion I will quote what he has recently said on the subject.

"My belief in this operation has only become stronger. However, the experience afforded by eleven additional cases has not made me any more confident that the next patient I operate upon will either survive the primary operation or will ultimately be cured. On the contrary, in contrast with other abdominal operations, the more I perform this operation the more I respect and, possibly, dread it. Yet I adhere to it for the simple reason that, in my hands, all other operations for cancer of the uterus have been disappointing in their uniformly bad ultimate result, while with the radical abdominal technique I I have been able to save a fairly good percentage of my patients, and that, after all is said, is what the surgeon is after. If he be not content to set at naught his surgical reputation as far as primary results are concerned for the sake of ultimately curing more patients, he would best not meddle with this operation, which, in apparently favorable cases, is only too apt to turn out to be grave."

THE CAUTERY IN THE RADICAL TREATMENT OF CANCER OF THE CERVIX[1]

By X. O. WERDER, M. D., Pittsburgh

THE cautery, at least at the present time, is not generally associated with the radical operation of this condition, but is considered a very useful and important aid in the palliative treatment of cases of cancer which have reached the inoperable stage, and consequently, with its use we do not expect a cure, but merely a relief of symptoms and a temporary check to the advance of the neoplasm. But it is within the recollection of many of us here present when the cautery, either in the form of the galvanic loop or the cautery knife and dome, gave results which excelled all other methods of treatment then in vogue. I need only refer to some of our own countrymen, such as: Baker, of Boston, and Reamy, of Cincinnati, who, by a high amputation of the cervix by means of the hot platinum loop, succeeded in permanently curing a large percentage of early carcinomata of the cervix. The most remarkable record, however, was unquestionably obtained by Byrne, of Brooklyn, partly because of the great number of cases treated by him, as well as the wonderful results obtained by a minor operation without a single operative death. In the 367 cases treated by him during twenty years, he had nineteen per cent living five years after operation—this in spite of the fact, as I have been reliably informed by some of his colleagues and pupils, that he made no selection of his cases, but operated on practically all coming under his care, no matter how extensive and hopeless the neoplasm was found to be. This successful experience in the use of the cautery was

[1] Read before the Third Clinical Congress of Surgeons of North America, New York City, November 14, 1912.

not confined to these few men, but many others in Europe had similar results, especially Carl Braun, of Vienna. Even Schroeder, who was not an advocate of the cautery, but used it only in the advanced cases, was surprised at several unexpected cures, in apparently hopeless cases, by this means.

It may well be asked why such favorable results in advanced cases of carcinoma of the cervix are so extremely rare now, though the cautery is still in common use in inoperable cases. Do we use the same technique and methods so successful in the hands of Baker, Byrne, and others? Baker[1] states that it is of the greatest importance not only to apply the cautery very thoroughly and over a considerable length of time, but also to keep these cases under observation, to excise any suspicious tissues promptly and again cauterize very thoroughly. After two or three such applications he has succeeded in getting some of his best results.

Byrne[2] also strongly emphasizes the importance of very thorough cauterization, no matter by what means the growth may have been removed. He also wishes to impress the patient with a sense of the vital necessity of frequent examinations after any operation. I am afraid there are few of us who carry out the instructions of these old masters, particularly with reference to repeated cauterizations. We are all inclined to be too pessimistic in dealing with these advanced cases. We lack interest in these inoperable cases, because we consider them doomed from the outset, and think our duty fully performed by giving them the benefit of one thorough cauterization. We are then only too ready to dismiss them from our observation and leave them to their sad fate, without any encouragement to return for further treatment. With greater patience and perseverance and more confidence in the cautery we might be more successful in prolonging these unfortunates' lives, and, possibly, even occasionally obtain a cure.

What impressed me as the most remarkable feature of the Byrne operation, especially when compared with all other ordinary vaginal operations for cancer of the cervix, was the almost uniform absence of local recurrences. Byrne[3] says: "I have never known an instance of relapse in which the disease had returned in the part from which it had been originally excised. I have repeatedly observed the reappearance of the disease in the fundus, ovaries, or some adjacent tissues, but I have never known a single instance in which the disease has reappeared on or close to the cauterized surface from which the cervix had been removed by galvano-cautery." He explains this by stating that "there is hardly any doubt that the developmental activity of the cancer cells or germs in certain stages, and under certain conditions, may be arrested or permanently destroyed by a degree of heat much below that which would be detrimental if not destructive to normal tissues." He is certain that the thermal agent exerts some modifying influence on the pathological processes much beyond and deeper than the surfaces actually cauterized, hence the importance of repeated applications, so that "every spot suspected of contamination may be thoroughly charred." He regards the black and charred wound cavity as "the best safeguard against the recurrence of the disease." The local mechanical effect of the cautery, consisting in directly destroying the cancer cells and by producing coagulation and necrosis, preventing a direct implantation into healthy adjacent tissues, seems to me scarcely a sufficient explanation of the evidently deep destructive action on the cancer tissues not in close contact with the heated instruments. It seems to me to justify the assumption that some chemical action is produced, some toxins, perhaps, which penetrate the deeper structures, and while not seriously damaging the normal cells, inflict permanent injury to the less resistant cancer cells.

For this work I have used both the Paquelin and galvano-cautery, but I consider the latter much preferable and more effective. In my experience, it is more difficult to get a thoroughly charred and an absolutely dry and black surface with the Paquelin than with

[1] "Zur Frage der Heilbarkeit des Carzinoms," R. Lomer in Ztschr. f. Geburtsh. u. Gynäk., Bd. I.

[2] "Twenty Years' Experience in the Treatment of Cancer with Galvano Cautery," Am. J. Obst., N. Y., 1889.

[3] Trans. Am. Gynec. Soc., 1888, p. 188.

the properly constructed dome-shaped galvano-cautery.

The excellent results obtained in these minor operations for cancer of the cervix by the galvano-cautery in the hands of Byrne, and others, impressed the writer to such a degree that he was induced, almost eight years ago, to employ it in the total extirpation of the uterus for this disease. If I may be permitted a little digression and a personal explanation in this connection, I will briefly refer to an operation which I had been doing up to this time (eight years ago), and which is still spoken of as the "Werder operation"[1] in some of our American and English books on gyneco logy. The technique of this operation was practically the same in every detail as that described for the first time two years later, by Wertheim, in the *Archiv für Gynäkologie*. When I called Wertheim's attention to my description of the same operation, he frankly admitted my claims to priority in a personal letter to me and practically did the same in a communication to the *Archiv für Gynäkologie*, Bd. 62. Since that time Wertheim has materially changed and improved the technique of the operation in so many respects, that I feel he is justly entitled to all the credit of the operation now generally known under the name of "Wertheim," all the more so since I have abandoned it for the cautery, for the reason that its mortality seemed too high, at least in my hands, and scarcely offset the gain in permanent cures resulting from it, and because I saw in the cautery a safer and, possibly, just as effective a means to successfully combat this disease.

The technique of the cautery operation since I first tried it has undergone many changes, but the principal feature, complete igni-extirpation by means of the galvano-cautery knife and Downes' electro-thermic clamps, has always been retained. The first nineteen operations were completed entirely through the vagina, assisted often by the Schuchardt incision, but since then I have adopted a combined operation, beginning in the vagina and completing it by the suprapubic route. The difficulty of protecting the adjacent parts sufficiently, especially the ureters, during the application of Downes' heated clamps on the broad ligaments through the vagina, and the impossibility, at times, of deciding whether the case be a suitable one for radical treatment without abdominal exploration, induced me to adopt this change of technique.

The operation is preceded by a thorough curettement of the diseased surfaces, and cauterization until all oozing is controlled. The cervix is then firmly held by volsella forceps and an incision is made entirely around the cervix, as far as possible from the affected area, by means of the cautery knife, kept at a dull heat, to prevent oozing and rendering the wound dry. While making traction upon the cervix, the dissection is carried up carefully between the bladder and uterus, an assistant with a retractor drawing the bladder well away from the heated knife, until the peritoneum is reached, which is, however, not opened. Douglas' pouch is opened posteriorly by the same careful dissection, assisted by the index finger, and the lateral vaginal attachments are then burned through. The vaginal wound is now carefully inspected, and wherever the surfaces and edges do not look black and charred or show some oozing, they are gone over again, by means of a dome-shaped cautery, until they look perfectly dry and leathery. The vagina is then tightly packed with gauze and the patient's abdomen prepared for laparotomy.

A free incision is made between symphysis and umbilicus, and the uterus seized with a stout vulsellum forceps, after packing off the peritoneal cavity very carefully with gauze pads. The bladder peritoneum is incised from side to side, opening into the cavity previously made by dissecting off the bladder from the uterus through the vagina. A Downes' electro-thermic clamp is then applied to the right infundibulopelvic ligament and round ligament, the surrounding parts being carefully protected by the shield and additional wet pads; the tissues included in the forceps are then thoroughly cooked

[1] This operation was described by me in the Am. J. Obst., N. Y., March, 1898, under the title of "A New Operation for the Radical Treatment of Cancer of the Uterus, Consisting of the Removal of the Uterus and Vagina en Masse by the Suprapubic Method," and was successfully performed for the first time January 5th of the same year. This patient is living and well at the present time

until a thin, white ribbon is obtained. The clamp is then removed and the ribbon cut through near its inner edge, and if, after a few minutes, no bleeding occurs, dropped. The other side is then treated in exactly the same manner.

This brings the operation down to the parametrium. By passing two fingers of the left hand through the opened Douglas' pouch into the vagina and grasping the uterus between the two fingers, one on each side of the cervix, the uterus is firmly drawn up and its parametrium made tense and more easily accessible. This is then seized, first on the least affected side, in a clamp, after the bladder and ureter on that side have been carefully protected and is then burned through; the ribbon thus made is cut through, and then another portion of the broad ligament and sacro-uterine ligament is burnt in the same manner, thus freeing one side of the uterus from all its attachments. It is then a comparatively easy matter to treat the opposite parametrium in exactly the same way. If our technique has been good, not a drop of blood is lost, and the surfaces are all perfectly dry. If, however, we should find a bleeding point, either the burning may be repeated, or, if one of the larger vessels is bleeding, a catgut ligature would be preferable. With a little experience in this technique it will rarely be necessary to use any ligatures. A very important point is the thorough oiling of the inside plates of the clamps with sterile olive oil; the failure to do so will cause a baking of the tissues to the clamp which on opening will tear the ribbons and possibly bring on some bleeding. I have never seen any bleeding follow from a well-formed ribbon.

The stump of the vagina is now exposed, its cauterized edges inverted downward and approximated with a continuous catgut suture. Next the bladder is brought over the sutured stump of the vagina and its peritoneum stitched to the rectum posteriorly. The broad ligament stumps are carefully covered up with peritoneum on both sides, just as after a typical panhysterectomy for fibroid tumor. The abdomen is then closed without drainage. The abdominal part of the operation is practically that of an ordinary panhysterectomy, with only this difference that the broad ligaments and parametria are clamped and burned, instead of tied with ligatures. No preliminary dissection of the ureters has thus far been made; for the exposure of the parametrium and for the protection of the ureters we have depended on firm traction upon the uterus and the sides of the bladder with two fingers hooked through the opening in Douglas' pouch over the cervix while the clamps are placed in position. Only one injury to the ureters has occurred since doing the combined operation and that did not manifest itself until about ten days after operation. When operating exclusively through the vagina there were two ureterovaginal fistulæ as a result of heat necrosis; one of these was subsequently cured by an implantation into the bladder by myself; the other case had the kidney removed by another surgeon. In a few cases, however, I was obliged to expose the ureters freely down to their vesical insertion, enabling us to excise the parametrium more completely without fear of damage to these important structures.

During the last year the procedure just described has been slightly modified, by first amputating the cervix by the cautery knife, doing a fairly high amputation, accompanied by thorough cauterisation of all parts until complete hæmostasis is secured and a black, dry, charred wound surface presents itself everywhere in the roof of the vagina. The object of this is an endeavor to use more extensive and prolonged heat application to the vaginal surfaces, especially about the basis of the parametria, thus obtaining, in our opinion, a more complete and extensive destruction of the cancer elements in this particular field of operation. While this additional step takes up a little more time, it facilitates the subsequent intra-abdominal work considerably, especially in relation to the parametria. Another change is the use of ligatures for the infundibulopelvic and round ligaments, instead of the heated Downes' clamps, confining the application of the latter to the deeper structures in the pelvis, where cancer extension usually occurs, the upper portion of the broad ligament be-

Downes' Clamps.

coming rarely, if ever, involved in the operable forms of carcinoma of the cervix. As ligatures can be applied much more quickly than the heated clamps, considerable time is saved by this modification, without detracting in any way from the effectiveness of the operation.

The regional glands in this operation, excepting in a few of the later cases in which enlarged glands could be distinctly outlined by the exploring fingers in the abdomen, have not been disturbed. While routine removal of the iliac glands is insisted upon by a large number of our modern operators, it is still an open question how much the patient gains by this additional tax on her vitality, and whether the results compensate her for the increased risk attending it. Wertheim's results, whose experience in this work has been larger than that of any other surgeon, have not been encouraging. Of the cases with multiple gland involvement they had only five

living at the end of five years. It is still undecided whether, after all, there is not some truth in the suggestion made from different sources that the gland contains some elements not only able to resist cancerous invasion, but also under certain conditions destructive to the cancer cells. On the other hand, by breaking into glandular structures and liberating the cancer elements, smearing them into the open connective tissues, as is unavoidable sometimes in their removal, we may be the means of laying the foundation for a subsequent cancerous infiltration in that region. At the present time, therefore, I am, along with many other gynecologists, very skeptical in regard to the utility of the routine removal of regional glands, especially so, as I have seen in a number of recurrences glandular involvement in the upper part of the abdomen, behind the kidney, and in one case involvement of the mediastinal glands and those of the neck. These experiences prove beyond a doubt that to remove all the glands liable to become affected in this disease is a physical impossibility; to extirpate the few accessible ones only seems scarcely worth the additional risk.

During the period of almost eight years in which we have been doing this operation of

igni-extirpation of the uterus, 78 cases in all have been operated by myself and my associate, Dr. Weiss. Only carcinoma of the cervix have been included in this number; for carcinoma of the corpus uteri either a panhysterectomy or a simple vaginal hysterectomy have given such satisfactory results that no change in treatment has been considered necessary or desirable. All cases of carcinoma of the cervix subjected to radical operations were treated by igni-extirpation during this period with exception of one, in which the uterus was extirpated without the cautery because an accident just previous to operation had put our electrical apparatus out of use for the time being. In another case a high amputation of the cervix by the galvano-cautery according to Byrne method was made, on account of the age of the patient, who was 67 years old. Neither of these two cases are included in this series of 78 cases. In all these cases the clinical diagnosis decided the treatment, but this diagnosis was subsequently confirmed in every instance by the microscope. In none of these was it necessary to depend on a microscopical diagnosis, as the cases were all sufficiently advanced to be readily recognized clinically as carcinoma. I mention this, not from lack of confidence in the pathological diagnosis, but because I consider a clinical diagnosis confirmed by the microscope as final and unquestioned. Our average percentage of operability during the last fifteen years, during which I have been doing the more radical operation for cancer, has been 38 per cent. In some of these cases we started out with the expectation of doing a complete extirpation, but after curettement and cauterization we found the disease too far advanced to proceed any further; in several the operation was abandoned after an exploratory laparotomy.

Four of the 78 cases died as a result of the operation. One, who had nephritis at the time and previous to operation, died three weeks later from uræmia. The second died six days after operation from a typical acute dilatation of the stomach. The third one succumbed two hours after operation from shock. It was a case with marked involvement of the iliac glands with deep infiltration of the tissues and also extension to the bladder, which was badly torn during the enucleation. These complications, however, were not discovered until the operation was well under way, when it was too late to discontinue it. The fourth and last death occurred two weeks after operation, in a woman quite anæmic and enfeebled and in generally poor physical condition. She left the table with a very weak pulse and we had great difficulty in getting her to rally. She developed a hypostatic pneumonia at the end of the first week, to which she finally succumbed. This makes a primary mortality of 5.1 per cent, which compares very favorably with that of any other operation for this condition.

The most notable improvement in the operative mortality is unquestionably due to the absence of sepsis; not a single case has had any evidence of serious infection. In all my previous work in carcinoma of the cervix sepsis had been the cause of a large mortality. The same is noticeable in the work of others. Wertheim has an operative mortality of 93 in 500 cases, an average of a little over 18 per cent; of these almost half succumbed to septic complications. Schauta, who is an enthusiastic advocate of an extensive vaginal operation for cancer, has a mortality of 28 in 258 cases, or 10.8 per cent. Sixteen of these 28 deaths, or over half of them, were caused by septic conditions. The elimination of sepsis in our cases is not due to the preliminary curettement and cauterization of the diseased cervix, because that is done by Wertheim and Schauta, as well as practically all other operators, but must be attributed to the "cooking" process of the parametria, which, according to Liepman, is frequently the habitat of various pathogenic organisms in cancer of the cervix. By the thermic action of the clamps these are not only destroyed in the field of operation, but no large, open wound spaces are left for absorption and further development. In all other operations, no matter by what method, it will be very difficult to eliminate entirely this great danger of infection. As there is practically no loss of blood in this operation the danger of heart shock (so common in the radical procedure) is greatly minimized.

No.	Name, Age, Date.	Referred by Doctor	Operation.	Results.
1	Mrs. L., 31, Dec. 12, 1903	Stewart	Vaginal igni-extirpation	Death after three weeks from uræmia.
2	Mrs. V., 48, April 16, 1904	Waide	Vaginal igni-extirpation	Death after four years from paresis. No recurrence.
3	Mrs. M. H., 66, April 18, 1904	Boyce	Vaginal igni-extirpation	Death after four years from recurrence.
4	Mrs. P. M., 47, May 11, 1904	Werder	Vaginal igni-extirpation	Living, seven and one-half years. Had amputation of cervix for cancer one year before radical operation was done.
5	Mrs. H., 53, June 18, 1904	Graham	Vaginal igni-extirpation	Death almost a year later from recurrence in inguinal region. Site of operation clear.
6	Mrs. A. Y., 55, July 7, 1904	Shields	Vaginal igni-extirpation. Implantation of left ureter into bladder about two years later (June 1, 1906)	Death from recurrence in glands after two and one-half years. Left ureter severed at operation. Repaired two years later.
7	Mrs. C. S., 70, Sept. 8, 1904	Grube	Vaginal igni-extirpation	Death after six years from other cause. No recurrence.
8	Mrs. E., 53, Oct. 27, 1904	Goulding	Vaginal igni-extirpation	Living, seven years.
9	Mrs. R. S., 39, 1904	Werder	Vaginal igni-extirpation	Death after three years from recurrence in iliac region.
10	Mrs. W., 48, Jan. 16, 1905	Warnick	Vaginal igni-extirpation	Living, almost seven years.
11	Mrs. K., 36, Mar. 6, 1905.	Wood	Vaginal igni-extirpation	Death after five months from recurrence in vagina.
12	Mrs. J. H., 35, Mar. 8, 1905	Werder	Combined igni-extirpation. Repair of recto-vaginal fistula two months later (May 18, 1905)	Death after three months from suppression of urine. Recto-vaginal fistula.
13	Mrs. W.McC., 38 Mar. 21, 1905	Alder	Vaginal igni-extirpation	Death after three years from recurrence in inguinal region. Site of operation clear.
14	Mrs. E. R., 40, April 26, 1905	Matson	Vaginal igni-extirpation	Living, six and one-half years.
15	Mrs. LeC., 32, July 5, 1905	Deans	Vaginal igni-extirpation	Death after one year from recurrence.
16	Mrs. M. C., 53, July 10, 1905	Sayer	Vaginal igni-extirpation. Recto-vaginal fistula repaired two months later, and again thirteen months later (Sept., 1905, and Oct., 1906)	Living, six and one-half years. Recto-vaginal fistula.
17	Mrs. J. C., 56, Oct. 23, 1905	Pollock	Vaginal igni-extirpation. Extirpation of recurrent carcinoma of vagina eighteen months later (April, 1907)	Death after four years from recurrence in bladder and vagina.
18	Mrs. M. S., 49, Oct. 26, 1905	Lewis	Vaginal igni-extirpation	Living, six years. Vesico-vaginal fistula still present.
19	Mrs. H. L., 49, Dec. 15, 1905	Lewis	Combined vaginal and abdominal igni-extirpation	Death after two years from recurrence. Right ureter severed at operation.
20	Mrs. Z. F. B., 54, Dec. 20, 1905	Gormley	Vaginal igni-extirpation	Living, six years.
21	Mrs. J. W., 47, April 30, 1906	Clark	Combined vaginal and abdominal igni-extirpation	Death from recurrence.
22	Mrs. D.P.B., 48, May, 1906	Irish	Combined vaginal and abdominal igni-extirpation	Living, five years. Health poor, but there is no evidence of recurrence.
23	Mrs. S. F., 38, May 22, 1906	Sturgeon	Combined vaginal and abdominal igni-extirpation	Living, five and one-half years.
24	Mrs. S. H., 51, June 18, 1906	Miller	Vaginal igni-extirpation	Living, five and one-half years.
25	Mrs. J. E., 49, Sept. 18, 1906	Werder	Combined igni-extirpation. Repair of vesico-vaginal fistula seven months later. Retroperitoneal cyst drained about three and one-half years later	Living, five years. Had vesico-vaginal fistula. Repaired. Recurrence.
26	Mrs. G. W., 39, Sept. 22, 1906	Somerville	Combined igni-extirpation. Removal of fatty débris from abdominal wall thirteen months later (Oct., 1907)	Death eighteen months later from recurrence in glands.
27	Mrs. A. P., 35, Sept. 25, 1906	Stanton	Combined vaginal and abdominal igni-extirpation	Death after one year from recurrence in other parts.
28	Mrs. J. M., 39, Oct. 9, 1906	Pridgeon	Combined vaginal and abdominal igni-extirpation	Death after one year from recurrence.
29	Mrs. W. S., 36, Nov. 28, 1906	McNall	Combined vaginal and abdominal igni-extirpation	Death after five years from recurrence.

No.	Name, Age, Date.	Referred by Doctor	Operation.	Results.
30	Mrs. F. P. J., 47, Jan. 30, 1907	Jepson	Combined igni-extirpation	Vesico-vaginal and rectovaginal fistulæ. Death after two and a half years.
31	Mrs. J. M., 39, Feb. 26, 1907	Oliver	Combined igni-extirpation	Death after one and a half years, cause not stated.
32	Mrs. P. D., 47, April 9, 1907	Burns	Combined igni-extirpation	Living five and a half years. No signs of recurrence.
33	Mrs. F. B., 56, June 15, 1907	Allison	Combined igni-extirpation	Living five and a half years. No recurrence.
34	Mrs. C. V., 62, June 25, 1907		Combined igni-extirpation	Death two weeks after operation from acute dilatation of stomach.
35	Mrs. O. C., 48, Aug. 14, 1907	Burchinal	Combined igni-extirpation	Living and well after five years.
36	Mrs. G. H. L., 57 Sept. 24, 1907	Emerling	Vaginal igni-extirpation	Living five years. No signs of recurrence.
37	Mrs. W. P. S., 55, Oct. 29, 1907	Shupe	Vaginal igni-extirpation	Both ureters sloughed; vesico-vaginal fistula. Death from pneumonia one year later.
38	Mrs. C. L. T., 54 Dec. 9, 1907	Tittle	Combined igni-extirpation	Living five years. No evidence of recurrence.
39	Mrs. E. C., 60, Jan. 11, 1908	Caldwell	Combined igni-extirpation	Death two years ago, probably from cancer.

Accidents to ureters and bladder and other adjacent organs are, I believe, with a little familiarity with the technique employed, no greater in the cautery operation than with other methods which strive to do a thorough radical extirpation of the uterus with a large portion of the parametria and upper portion of the vagina.

As it would be impossible, in the limited time at my disposal, to discuss at length all the cases in this series, I will confine myself very briefly to those whose operation dates back five years or longer, because patients who have survived five years may as a rule be considered permanently cured. The percentage of such survivals is, therefore, a fair test of what an operation has been able to accomplish to save life. We have fortunately been able to keep in touch with practically all our patients by receiving reports from them personally at irregular intervals, or through their physicians; I am, therefore, in a position to account for at least all the cases which come into this group. In thirty-nine cases five years or more have elapsed since operation. Twenty-one of these were vaginal igni-extirpation and eighteen combined. Of these, eighteen have survived the five-year limit, or 46 per cent. Five of these, however, have died since—one after six years from an intercurrent disease, and four from recurrence; one after six and a half years from carcinoma of the liver; one after six years from involvement of retroperitoneal glands and spinal cord; one after five and a half years from recurrence in the lumbar glands, and one after five years, place of recurrence not known. That four deaths, 22 per cent, should have occurred more than five years after operation, when by a generally accepted rule the cancer victims should have reached the harbor of safety, is calculated to upset our present views concerning the prognosis of cancer operations, and would seem to necessitate an extension of the period of safety beyond five years.

Very little definite information can be obtained from a review of our statistics pertaining to such late recurrences; it is therefore not clear whether my experience has been exceptional and different from that of other operators, or whether less careful attention has been given patients who have passed the supposed danger limit. At any rate, such a large percentage of late recurrences should not fail to attract the attention of operators having a larger material at their disposal and lead them to make a thorough investigation of cases who have passed the supposed safety limit. Such an investigation would not only prove extremely interesting and instructive, but would be of considerable practical importance, as it would promptly solve the question which in view of my experience naturally presents itself, whether our views

concerning the prognosis of our cancer patients have been too optimistic and whether we are still justified in considering five years sufficient to pronounce a patient cured. It may be objected that, as one of these patients died five years after operation, she should not be placed in this group, because while she was living after five years she was not well at this time, but suffering from a far advanced recurrence; even if a second patient, whose death occurred five and a half years after operation and whose condition of health may be considered doubtful at the five-year period, were excluded, it would still leave two patients out of eighteen who certainly had no evidence of a return of the disease at this time, a sufficient percentage to justify a revision of our views hitherto held.

There are at present living and well thirteen cases, 33⅓ per cent, of these, three have lived eight years and more since the operation; three, seven years and more; two, over six years, and five, five years and over. Nine of the survivals were cases of vaginal igni-extirpation, and four combined. This leaves twenty-one cases whose death occurred within five years of operation, including the two operative deaths.

Of the nineteen patients who survived the operation twelve are known to have had a recurrence, the seat of recurrence being local in two, and in the inguinal, iliac and lumbar glands in ten. Two deaths were due to intercurrent diseases and in five cases cause of death is unknown. Death occurred within one year in seven, in two years in four, in three years in five, in four years in three. Eleven patients were less than forty years of age; of these only one is living at present. This seems to confirm the finding established by a number of experienced operators—that in carcinoma of the cervix, at least, age is of considerable importance from a prognostic point of view. Patients who have passed the menopause or are very close to that period are more favorable subjects for treatment than those during the height of their sexual activity. There seems to be no doubt that lymphatic extension occurs much earlier and more rapidly in young patients than in the old, and this probably accounts for the difference in the prognosis.

A comparison of the permanent results in my cases with those of other operators shows unquestionably a very marked improvement over those obtained by all the older methods in which no special effort is made at resection or destruction of large portions of the parametria and the upper part of the vagina in proximity to the malignant neoplasm, with a primary mortality I believe considerably in favor of igni-extirpation. We have not, however, been able to reach the brilliant results reported by such men as Zweifel, Schauta and Wertheim, and other European surgeons. No American operators so far have equaled or even come near the percentage of cures credited to these men, though many of them have been employing the same methods and operative technique. There can be only one explanation of this, which is that in this country the material reaching the surgeon gives less favorable prognosis, because in the majority of cases the disease is further advanced, in fact has very often reached the border-line stage, where results must necessarily be more unfavorable, no matter what method of treatment is adopted.

Our urgent need is a systematic and energetic propaganda for the purpose of interesting the medical profession and instructing the American public in the cancer problem in a manner similar to that carried on in Germany so successfully for many years, and which has borne fruit to such an extent that instead of having an operability of 38 per cent, as in my case, and even less in the hands of many other American operators, the operability in many sections of Germany and Austria has exceeded 60 per cent. We have reached a point in the treatment of uterine cancer when little more is to be expected in the technical improvement of our radical operations, as they have almost reached the limit of surgical skill; our only hope for further improvement in our results of the radical treatment of cancer is an earlier operation.

DISCUSSION BY ROBERT L. DICKINSON, M. D., BROOKLYN

IT is most fitting and appropriate that this important paper on the cautery in the radical treatment of cancer of the cervix should be read in the city that was the home of John Byrne by the man upon whom his mantle has fallen. We pelvic surgeons of Brooklyn, who were taught by the genial gynecologist of St. Mary's Hospital and follow in his steps, regret that we cannot show so long an array of cases as Pittsburgh boasts, but we, too, hold strongly to the faith that no other operation can compare with cautery hysterectomy from certain points of view, and, like Dr. Werder, are trying to perfect the methods of carrying out this mode of attack. It is possible that the reason removal by cautery fell into disuse was the mechanical difficulty connected with the battery of Byrne. When it worked, it worked perfectly, but it took the knowledge of a Palmer as assistant to get constant results in heating the knife. All benzine-heated tips are clumsy and blunt. No reliable method of heating a flat platinum blade has been available until the electric current, harnessed to such an outfit as I here show, gave us a delicately adjustable yet powerful effect. Thereby the Byrne method comes into its own again, and we are able to drive home once more the axiom of our great Brooklynite with his unmatched results; namely, that the ideal treatment of the broad ligaments is sealing of their lymphatics by a "deep dry roast."

The second betterment that would tend to restore the operation of Byrne is the addition to his operation of a relatively wide dissection of the broad ligaments with the cautery knife. Of this I shall show you a five-year example on the screen (Fig. 1). Such broad ligament removal is adapted to cases of beginning or suspected infiltration of the broad ligaments. In general, however, the following statement applies.

The theorem is susceptible of argument that *most cases curable are curable by lesser operations*. For such cases as I here show (Figs. 3 and 4), where only a small area of cervix was affected, the typical operation of Byrne has given 5 years' immunity. The cervix with a small section of the vaginal wall has been

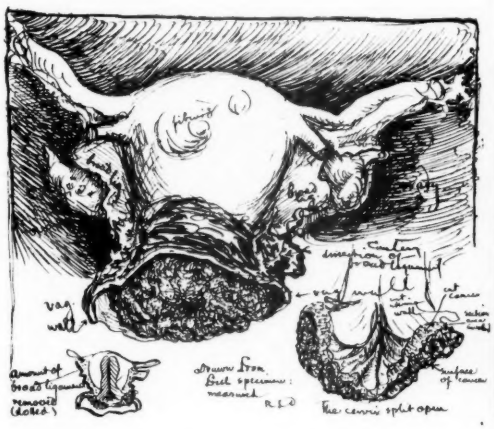

Fig. 1. Specimen drawn immediately after removal, showing amount of broad ligaments readily removed with cautery knife.

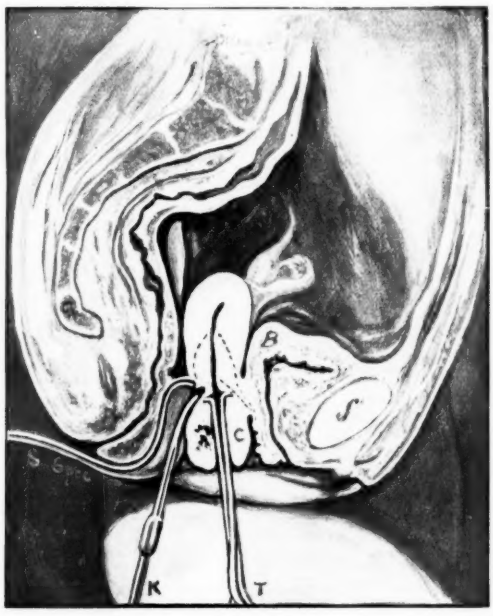

Fig. 2. Operation of Byrne, showing, by the dotted lines, portions of uterus removed. Applicable to very early cases only. Drawn for Dr. Byrne by R. L. Dickinson.

Fig. 3. Life size sketch of portions of uterus removed in two steps at one session. The whole of the cavity has been included. Drawn at once after removal. Five-year case

amputated in a cone shape, the tip of the cone running up into the body of the uterus, as in Figs. 2 and 3, and up to the very fundus, as in Figs. 3 and 4. Thereafter the fundus itself may or may not be taken out, as one chooses.

I have removed the uterus, ovaries and

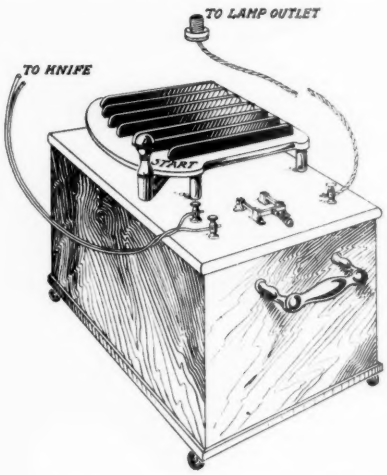

Fig. 5. Rotary converter used with Edison direct continuous current. A simpler apparatus is employed with the alternating.

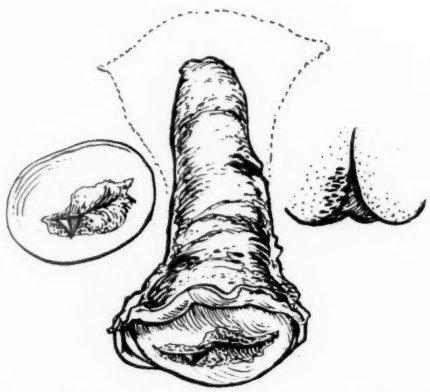

Fig. 4. Life size sketch of section removed by cautery, the first portion including the whole of the cavity. Very early case. Drawn at once. Five-year freedom.

tubes, and considerable parametrium in one piece with the cautery, without ligature save one strand on a large varicosity of the broad ligament, and without oozing. But this is a surgical stunt and not to be recommended. If in an early case one desires to remove tubes and ovaries, two ligatures on each side are simple and sufficient and the abdominal wall need not be incised. I have had the pleasure of seeing Dr. Werder do his operation in Pittsburgh, but inasmuch as the parametrium presents the danger zone of extension in cervix cancer, it seems to me that if a vaginal attack has been undertaken the whole work had better be completed through the vagina. The purpose of the cautery is to seal the lymphatics. The lymphatic channels which carry dangerous cells are those of the broad ligaments and are sealed by Dr. Werder in his vaginal work. The clamp on the ovarian and round ligament vessels of the upper third of the broad ligaments is, therefore, an unnecessary precau-

Fig. 6. Heavy platinum knife which retains its heat even in working in wet tissues.

tion against cancer located in the cervix and a considerable difficulty and complication. His clamp follows the method of Downes. Downes' clamp is a modification of the Skene clamp, adding to the power and ecraseur action of the original instrument. Again, therefore, the operation advocated by Dr. Werder is, in its second step, a modification of a Brooklyn manner of hysterectomy, that with electric hæmostatic clamps.

Moreover, to really affect cancer statistics, an operation should be advocated which is within the reach of the surgeon and gynecologist of reasonable skill, because the more formidable operation cannot be undertaken by him. And, lastly, consent to the vaginal operation may be obtained earlier and more often than to the radical abdominal operation, for we are obliged to state to the patient that the attempt from above is one accompanied by a high mortality.

We of the American Gynecological Club had the pleasure of seeing all the greatest operators of Germany, with one or two exceptions, do Wertheim operations, and I watched Dr. Wertheim carry out his own procedure more than once this summer. It should be said with the strongest emphasis that the Wertheim operation is an operation to be done only by the most expert abdominal surgeons, because the wide dissection of the ureters and the very great difficulty in handling the veins deep in the lateral pelvic wall demands large experience and masterly skill and delicacy, and calls for a brilliant illumination deep in the pelvic cavern by the electric arc beam; and even then the percentage of injuries to the ureter and the danger of peritonitis loom very large.

Earlier operation, vaginal operation, cautery operation—these are to my thinking, the direction of chief progress, over against the day of a successful serum, and even then the lesser operations will need to be combined with the far reaching injections.

The following data are added to make clear the discussion printed above.

The apparatus comprises two electrical devices. One is known as a rotary converter. This is used to transform the direct current into an alternating current. An alternating current may be transformed far more easily than a direct current. Therefore, the alternating current is used. This alternating current from the rotary is in turn put through a closed circuit transformer. This closed circuit transformer stops down the voltage from that obtained from the rotary (about 75 volts) to about 20 volts. This 20 volt A. C. is obtained from the secondary of the transformer, and may be regulated from 0 to 20 volts. At the same time, in converting this higher voltage A. C. into a lower voltage A. C. we are also transforming the quantity of electricity from a lower amperage to a correspondingly higher amperage output, so that one is able to obtain a lower voltage and higher amperage. This, then, is used for heating the cautery knives (Fig. 5).

Between the transformer and the knife run particularly heavy cables, in order to lower resistance and to prevent heating. This applies especially to the wires running through the handle to the knife. This handle is very heavily insulated and does not heat up in a long operation. The absence of a switch in the handle seems to me also to make for lowered resistance and cooler structures, but some operators prefer such a switch in the handle.

The peculiarity of my knife, in which it differs from others, lies simply in its larger mass of metal. Thereby the lesser degree of heat is longer held, and thereby also in connective tissue planes the slightly curved blunt blade can push away structures like the bladder (Fig. 6.)

The differences from previous apparatus, and practically the whole story of efficiency in this outfit, now about two years in use, depends on two things: a powerful rotary converter and a powerful knife connected by heavy wire. Little knives and thin knives cool quickly, and, in consequence, the operator heats them far too hot, so that the tissues are charred instead of being cooked to horn. A black scab on the end of a vessel is knocked off by the blood current or the retractor. The tough, white, stiff surface, feeling and looking like horn or rubber, is the tissue to leave in the track of the knife. Thus he who has used the method a few times is not afraid to cook the uterine, and trust to the cooking to hold the vessel, but the beginner will sleep better with ligatures about these big vessels.

The outfit is made by the Wappler Electric Manufacturing Company, of New York.

Steps of the operation. Byrne worked with the patient in Sims' posture in order to secure a ballooned vagina and save anterior wall retraction. I prefer the dorsal posture because the anatomy of the broad ligaments is more easily kept in mind.

Rotten tissue may be curetted from the cervix cavity and iodine or pure carbolic acid swabbed over the surface and the cervix closed by sutures or clamps. In early involvement Byrne's method of spreading his instrument in the canal gives a steadiness of hold and a facility of manipulation possessed by no other measure. The cuff of the vaginal wall is dissected back widely when the growth has attacked a portion of the cervix near the vaginal

wall. Where the disease is in the canal alone this is not essential and the dissection may begin near the cervico-vaginal junction. Dragging downward on the uterus and making counter-traction so that the line of incision is taut, the knife is pressed firmly against the vaginal wall, which must turn white for a few millimeters each side of the cut. Charring is to be avoided as far as feasible and also bright redness of the platinum. The perpetual refrain of this operation must be that of Byrne—"less heat," "*less* heat," "a deep *dry* roast," "a *deep* dry roast." The constant fault is too much heat, and, as I have said and must continually reiterate, this is unavoidable with light knives and small conducting wires. The attendant keeps his hand upon the switch and the operator calls for more or less current according to the density of the tissues and their vascularity.

As soon as the vagina is freed, progress in the loose cellular tissue in front or behind the cervix goes rapidly — one dissects and one shoves. The slight curve of the knife and its blunt edge clear away the bladder rapidly. The posterior section is freed to the cul-de-sac. We next have the flat band of the broad ligaments to handle. Keeping away from the uterus and a safe distance from the ureter, the base of the broad ligament and the uterosacral ligament are cooked and severed. As we approach the uterine it may sometimes be dissected out by the knife, not too hot, and then carefully cooked, not with the edge, but with the flat of the knife. As is well known, the desired traction pulls into the field and away from the ureter a short length of uterine artery comparable, in a way, with what is removed by dissection. At this point the ligature may be placed if desired. The ureter may be dissected out. The cautery knife then frees the broad ligament to its thin upper portion. Great care — and this is most important — must be taken by the assistants not to use lateral tractors against the severed lower parts of the broad ligament, lest they drag the vessels open, if these have not been ligated.

The uterus now being free below, the rest of the proceedings, in my judgment, may better be by ligature, if one proceeds to take out fundus or adnexa.

THE EXTENDED VAGINAL OPERATION FOR CANCER OF THE CERVIX UTERI[1]

By GEORGE GELLHORN, M. D., St. Louis

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SINCE methodical researches into the location of recurrences after operations for uterine cancer have established the fact that in about 90 per cent of the cases the disease recurred in the parametric and paravaginal tissues in close proximity to the vaginal scar, the simple hysterectomy, abdominal or vaginal, has lost all justification in cancer of the cervix. The only logical conclusion from these investigations was to find means by which this seat of predilection of cancer recurrences could be eliminated. The object in view was accomplished by so-called "extended" operations, of which two types sprang into existence — the abdominal, devised by Clark, Ries, and Rumpf and perfected and popularized by Wertheim, and the vaginal, with which I wish to deal in the following.

The dawn of this extended vaginal operation dates back as far as 1893, when Schuchardt (1 and 2) devised a deep lateral incision through the pelvic floor by which an easier approach to the cancerous uterus was afforded. The untimely death of Schuchardt prevented this operator from further developing his method, but his idea was enthusiastically taken up and perfected by Schauta (3), who in 1908 presented to the scientific world a method more radical than its source and so original in many points that we may well term it the Schauta operation. The underlying principle in the method is this: to remove the greater part of the vagina and all of the parametric tissues together with the uterus. The question of removing the pelvic lymph glands is not taken into consideration in this method — a point which we shall have to discuss later.

Within the scope of this brief review only a general outline of the technique of Schauta's operation can be attempted. Those who wish to study the method more closely with the view of applying it in practice will find all

[1] Read before the Third Clinical Congress of Surgeons of North America in New York, November 14, 1912.

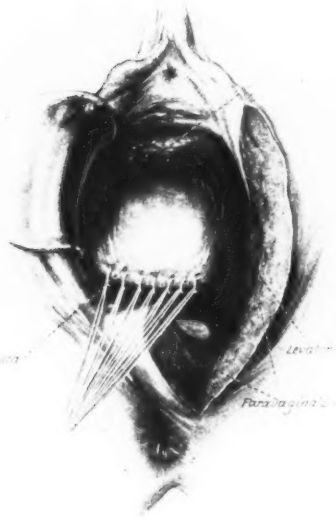

Fig. 1.

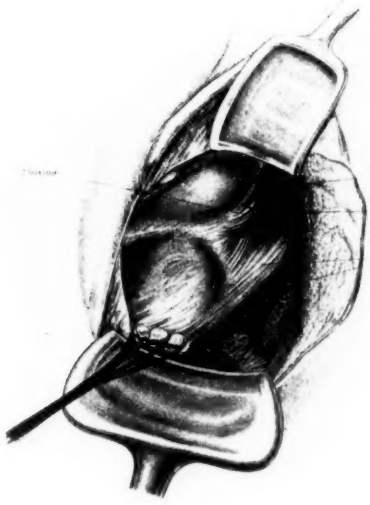

Fig. 2.

necessary details in Schauta's extensive monograph entitled "Die erweiterte vaginale Totalextirpation des Uterus bei Kollumkarzinom" (4).

After a thorough excochleation and thermocauterization of the cancerous area, the operation proper begins with:

Step 1. Circumcision of the vagina. Six or eight volsella are placed around the circumference of the vagina near the introitus, and distal from these a circular incision is made through the vaginal wall. The vagina is now dissected off in an upward direction for several centimeters.

Step 2. Formation of vaginal cuff. Thereby a "cuff" is formed, which is closely sewed up by strong silk sutures that take the place of the volsella. The upper portion of the vagina with the cancerous crater is thus shut off and contamination of fresh operative wounds is prevented. The long ends of the sutures are tied together and serve as guy ropes during the following steps of the operation, for which fresh instruments and gloves are to be used (Fig. 1).

Step 3. Separation of the bladder. The dissection of the vagina is carried still farther upward until the vesicovaginal septum is reached. If the disease does not extend too far, the bladder can readily be loosened; if need be, a small portion of the latter may be resected and the wound closed immediately. If a larger portion of the bladder be involved the case must be considered inoperable, since the experiences of all operators coincide as to the unfavorable results, both primary and late, of extensive resection of the cancerous bladder. We have thus at our disposal a criterion as to the operability or inoperability of a given case at an early stage of the operation, while it is yet time to stop without more serious damage.

Step 4. Paravaginal incision. Not until this most important question has been settled is the field of operation laid open by the so-called Schuchardt incision. This incision starts from the vaginal circumcision at the juncture of left and posterior vaginal walls, extends laterally to the lower end of the left labium minus, turns now downward and parallel to the rectum, and finally curves inward so as to encircle the left circumference of the anus and to terminate near the median line behind the anus.

The incision thus splits the paravaginal and pararectal tissues, the levator ani and coccygeal muscles, the cellular tissue of the ischiorectal fossa, as well as the skin of the perineum and of the lateral anal region down to the sacrum. The wound in the pararectal tissue is situated to the left only so far that the rectum and sphincter ani are not injured. Left-handed operators will find an incision on the right side more convenient. Spurting arteries are ligated at once; venous bleeding is usually copious, but is readily controlled by a thick gauze compress held in place by a weighted speculum.

The effect of this incision is surprising. Instead of a vaginal tube, we have before us a shallow exca-

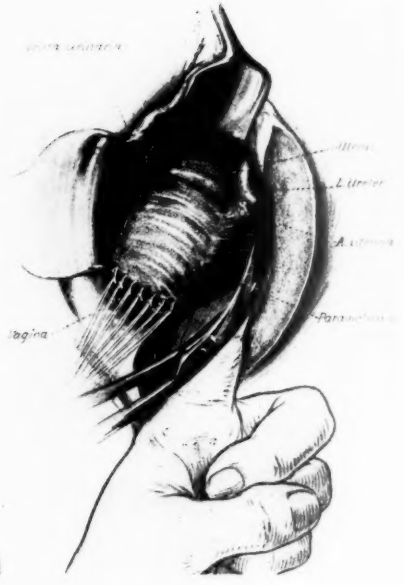

Fig. 3.

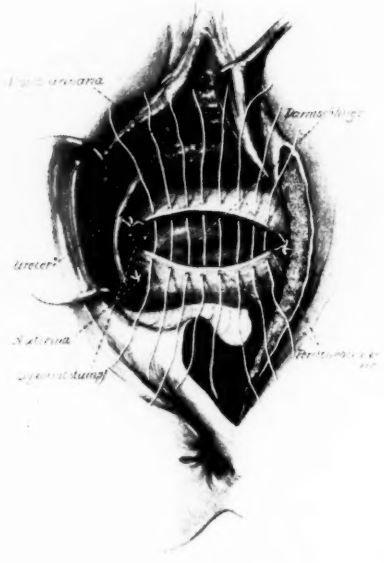

Fig. 4.

vation not deeper than one inch, and at the bottom of this the parametria are seen in full extent and within easy reach.

Step 5. Dissection of ureters. This is at once the most important and most difficult part of the operation, but it can be done in approved surgical fashion and under constant guidance of the eye. The uterine artery and vein lying above and behind the ureters are ligated and severed. This releases the ureter, which during the subsequent steps of the operation is held upward, together with the bladder, by a suitable retractor, and thereby protected from injury (Fig. 2).

Step 6. Excision of the parametria. The cul-de-sac of Douglas having been opened in the usual way, the two parametria are excised close to the pelvic wall. As the uterine artery has been ligated previously, there is, as a rule, active bleeding only from branches of the median hæmorrhoidal artery which supplies the sacro-uterine ligaments. This requires ligations, while the venous bleeding is checked by firm tamponade of the deep cavities on either side (Fig. 3).

Step 7. Removal of the uterus and closure of operative wounds. The rest of the operation differs but little from any ordinary vaginal hysterectomy. Schauta suggests the leaving behind of the ovaries if they are normal. The peritoneal cavity is closed carefully, the stumps of the broad ligaments having been drawn downward and fastened extraperitoneally. The large wound cavity beneath the peritoneum is loosely packed with gauze. The paravaginal incision is closed with buried and superficial sutures. Contrary to Schauta, I have so frequently observed fat necrosis that I am now in the habit of inserting a cigarette drain in the lower angle of the wound (Figs. 4 and 5).

It is at the request of your secretary, Dr. Franklin H. Martin, that I have ventured to describe to you the various steps of this operation, which, judging from the dearth of American literature, seems to be practically unknown in this country. My personal feeling in the matter is that the recommending of the Schauta operation is not a promising undertaking. Vaginal operations have fallen into disuse, and abdominal methods alone are popular at the present time. To the growing generation of operators, vaginal technique is fast becoming a terra incognita. Yet if we claim for ourselves the distinction of specialists, in a class with the gynecologists of other countries where the line of demarcation from general surgery is more sharply

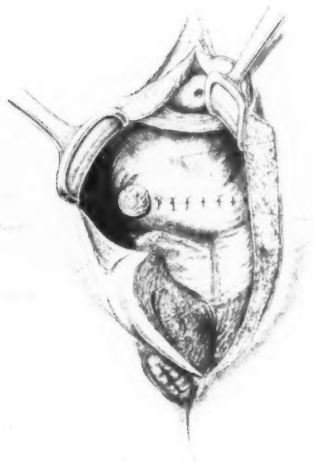

Fig. 5.

Fig. 6.

defined than in America, we must needs familiarize ourselves with every therapeutic procedure which has proved of value in our particular work. In medicine there exists not a single technical method which is applicable in all cases. As gynecologists, we cannot afford to adapt the patient to the one method which we may happen to know, but it is obviously our duty to vary the method according to the needs of the individual case. As regards the operative treatment of uterine cancer, even the most enthusiastic advocates of the radical abdominal method — Wertheim (6), Franz (7), Kubinyi (8), and others — admit that the latter, because of its high mortality, is contraindicated in fat patients, in women beyond the age of 60, and in those greatly reduced in strength by cachexia, sepsis, or heart disease.

Here, then, is a legitimate field for the Schauta operation, for its primary mortality is strikingly lower than that of the extended abdominal operation. For the purpose of comparison, equally large series of either operation performed by operators of equal experience should be considered, because thereby most of the objections against arguing from statistics are obviated.

TABLE I. PRIMARY MORTALITY

Vaginal				*Abdominal*			
	Operated Cases	Died	Per cent		Operated Cases	Died	Per cent
Schauta	498	44	8.8	Wertheim	500	93	18.6
Schauta (last)	212	10	4.6	Wertheim (last)	200	24	12
Thorn	96	5	5.2	Doederlein	134	24	17.9
				Bumm	131	28	21
				v. Rosthorn and Knauer (11)	117	16	13.7

While this table shows the lesser danger to life from the Schauta operation, it may be argued that by the extended vaginal method we cannot remove as much of the parametric tissues as by the abdominal radical operation. This may be true theoretically, but if we compare actual specimens obtained by either method, we will find that the difference is but slight (Figs. 6 to 8) — so slight, indeed, that the greater primary mortality of the abdominal operation in fat, cachectic, or very old patients outweighs the objection.

Fig. 7.

Fig. 8.

Neither should it be thought that cases operated upon vaginally have no chance of being cured permanently. The following table shows that the *relative* percentage of cures, i. e., the proportion between the number of operated cases and of those who remained free from recurrence for five years, is substantially the same with both methods.

TABLE II. RELATIVE PERCENTAGE OF CURES

Vaginal				*Abdominal*			
	Operated Cases	Well after 5 yrs.	Per cent		Operated Cases	Well after 5 yrs.	Per cent
Schauta (5)	258	85	37.0	Wertheim (6)	250	106	42.4
Thorn (10)	96	42	43.7	Franz (7)	87	33	37.9

It is rather significant that quite recently Krönig (9), one of the foremost advocates of the abdominal operation, admits "it is possible that in view of the results achieved by Schauta, the opinions as to the relative value of the abdominal and vaginal methods may undergo a change in the near future."

Table II further confirms the contention of Schauta that in very early cases of cancer (a category with which unfortunately we meet but very rarely in our country) the vaginal operation is not inferior to the abdominal method; in fact, it possesses advantages over the latter by virtue of its lesser primary mortality. This is particularly true of beginning squamous cell cancer of the cervix, in which, as Thorn (10) points out, the extension of the disease remains more superficial than in adenocarcinoma of the cervix.

There has existed in the past a distinct antagonism between the two methods as long as the systematic removal of pelvic lymph glands formed an integral part of the abdominal operation. But that is no longer the case. The great majority of abdominal operators have arrived at the conclusion that the extirpation of glands is of little more than prognostic value. If carcinoma is found in the excised glands, recurrence is practically certain to follow. Doederlein and Krönig (11) have collected, in all, 25 instances of permanent cure in women from whom cancerous glands had been removed. What does this small number mean if contrasted with the thousands of operations performed? After all, cancer is found in the glands only in about one third of cases that are still operable: Schauta (5), Wertheim (6), Baisch (12), and others. In these, then, the removal of the glands would be practically useless, while in the remaining two thirds it would obviously

be superfluous, not to mention the influence it may exert upon the primary mortality. There are now but few dissenting views on this proposition, which I upheld in the American Gynecological Society more than seven years ago (13).

This point of opposition, then, being eliminated, the two methods no longer differ in essential principles. Instead of being antagonistic, they complement each other. If we are familiar with both, we are in a position to employ individual treatment in the individual case.

For reasons given above, the vaginal method lends itself, most of all, to the rather large category of old, fat, or cachectic patients and those suffering from heart disease. In very early cases of cervical cancer, both methods should be considered on equal terms. In squamous cell cancer, the vaginal operation should be given preference; in adenocarcinoma, the abdominal method. In moderately advanced cases, where the uterus is not freely movable, the abdominal operation should, in my opinion, be the method of choice. In this latter class of cases, where the uterus does not follow downward traction and the ureters are surrounded by cancerous tissues, the vaginal method meets with excessive difficulties, and consequently yields poorer ultimate results.

Thus far we have only considered the *relative* percentage of cures. The following table shows the *absolute* percentage of cures; that is, the proportion between the number of cases free from recurrence after five years and the total number of cancer patients admitted to hospital and dispensary for the same length of time.

TABLE III. ABSOLUTE PERCENTAGE OF CURES

Vaginal	Per Cent	*Abdominal*	Per Cent
Schauta	16.4	Bumm	16
Thorn	19.3	Doederlein	17
		Wertheim	18.3
		Zweifel	23.4
		Krönig	25.3
		Franz	27.5

This difference in the absolute end results finds its explanation in the difference of operability obtained with the two methods, which is higher throughout with the abdominal method.

TABLE IV. OPERABILITY

Vaginal				*Abdominal*			
	Total of Cases	Operated Cases	Per cent		Total of Cases	Operated Cases	Per cent
Schauta (5)	1,007	498	54	Wertheim (6)	1,096	500	50
Schauta last 3 yrs			60–70	Wertheim last 2 yrs			61.9
Thorn (10)	217	96	44.2	Doederlein (14)	211	126	59.7
				Bumm (15)	218	133	60.9
				Zweifel (17)	222	115	51.8
				Franz (7)	245	200	82

This greater percentage of operability is due not so much to the fact that infiltrated parametria can be excised more fully from above than from below, as to complications which would ipso facto call for abdominal intervention. Schauta and Thorn mention, under this heading, pregnancy, fibroid, hernia, ovarian cystoma, and tubo-ovarian tumors.

Franz (7) claims that the more cases operated upon, the more cases will be cured. Mayer (14), on the other hand, remarks that a low percentage of recurrences is proportionate with a low percentage of operability; if the latter rises, the number of recurrences increases in equal proportion. To give but one concrete example: Franz subjected 82 per cent of his cases to the abdominal operation; Thorn 44.2 per cent to the vaginal method. Yet Franz had only 27.5 per cent of absolute cures in contradistinction to Thorn's 19.5 per cent. In other words, while Franz operated on almost twice as many cases, he had only 8 per cent more cures than Thorn. Under these circumstances, and further realizing that the results of Franz are thus far the very best obtained by anyone, can we still subscribe to the statement that the abdominal operation is the only one justified in cervical cancer?

In this greater percentage of operability there are included very far advanced cases, in which the infiltration of the parametria has extended close to the bony wall of the pelvis. Granted that in some few cases this infiltration may be but inflammatory in nature, the probability exists that in the vast majority of instances it is due to cancerous invasion. Even though in such "borderline" cases the operation may be possible from a purely technical standpoint, I believe that such cases should be excluded from any opera-

tion, whether abdominal or vaginal. The surgical axiom has been firmly established that when dealing with cancer we must operate in healthy tissue well outside of the affected area. In such far advanced cases of uterine cancer the observation of this general surgical rule exists only in theory. In reality, we have usually been forced in such cases to place our incisions in closest proximity to cancerous masses, and if the patient did not die at once, the inevitable result has been a speedy recurrence, or more correctly, a continued and even more rapid growth of cancerous tissues that were left behind. The oft-expressed idea of giving such patients the benefit of the doubt appears to me a fallacy. As a general proposition, they are worse off after the operation than before. Their morbidity, including accidental injuries, is greatly increased. In contradistinction to others, I have almost invariably found their recurrences much less amenable to palliative treatment than the primary tumor in cases in which no hysterectomy had been attempted. The psychic effect of an operation in such border-line cases is all too ephemeral. Hopefulness and encouragement give way to even deeper despair when, so soon after the pain and anguish of an operation, the old symptoms reappear with increased force. If we consider not only the pitifully small group of cases which might perhaps be cured, but also the very much larger number of patients that are not benefited, we will, for the present at least, not persist in an excessive radicalism. These cases can be made comfortable and their lives prolonged by palliative means if only our aim is directed towards the elimination of bacterial infection of the cancerous area. From the study of a sufficiently large material I have arrived at the conclusion that it is the mixed infection, with streptococci or staphylococci, which renders the lot of cancer patients so deplorable. This mixed infection once removed, the clinical picture of cancer loses many of its dreaded features for a considerable length of time, and then these advanced cases, taken as a whole, are better off under palliative treatment than after having been subjected to a dangerous and unpromising operation.

Yet one must agree with Thorn (14) when he says that this extreme radicalism has served a certain purpose. It has proved to us that by extending the limits of operating to the utmost, the coveted goal cannot be reached. Only the future will show whether the educational campaign which is being so universally waged in Germany and other European countries and here and there in our country (for instance, by the Barnard Free Skin and Cancer Hospital in St. Louis) will yield appreciable improvement in our final results.

The days of passionate partisanship for one or the other method seem to be about over, and the time is ripe for a more quiet and objective discussion. Until the long hoped for cancer remedy is discovered along biochemical lines, we may succeed in reducing our primary mortality and obtaining a greater percentage of cures in the patients operated upon if we do not unduly extend our operations to far advanced cases, and if we individualize more carefully than in the past, and select from the methods at our disposal the one which offers the best chances in a given case. The arguments presented in the foregoing may thus be condensed in the statement that both the vaginal and the abdominal extended methods have their place in the operative treatment of cancer of the cervix uteri.

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DISCUSSION BY HOWARD CANNING TAYLOR, M. D., NEW YORK CITY

AN operation for carcinoma of the uterus may properly be performed to accomplish one or more of three ends — we may operate to save life; we may operate to prolong life; we may operate in order to make the patient's life more agreeable, more bearable, and more satisfactory to her, and I might say also to her friends. In considering any operative procedure, we must consider the possible benefits along all three lines.

Speaking in general, the operation indicated for any carcinoma is the most extensive and most radical operation possible that is not associated with too great a risk to the patient's life, and which is not followed by too great deformity or interference with functions. This rule applies to carcinoma of the uterus as well as elsewhere.

In regard to carcinoma of the uterus, any deformity or interference with functions can be at once ignored, as we have only to consider the risk to the patient's life. When we consider the risk of the operation to the patient, we must remember that we are giving the patient her only chance, and no one with a real knowledge of the conditions of carcinoma of the uterus would hesitate to take the greater risk, if by doing so there is a corresponding greater chance of a permanent cure. There is, however, a risk beyond which it would not be right to go, and it is our problem with each individual case to determine, bearing in mind the risk to the patient and the chances of a cure, what it is best to do. In my opinion, for the case that is considered operable there is a reasonable operative risk, the operation elaborated by Wertheim, and described to-night by Dr. Weibel, is the operation usually indicated. So far as the risk to the patient is concerned, we have statistics from operators abroad, as well as statistics from a number of operators in this country, to prove to us that the risk is not so great that it cannot be assumed when we know the possible result. I have myself performed the operation enough times so that I will not hesitate to do it in a case that is in fair surgical condition.

Regarding the vaginal hysterectomy for carcinoma of the uterus, as advocated by Schauta and described to-night by Dr. Gellhorn, I am very glad that I had an opportunity this past summer to see it done in Schauta's clinic. It certainly is a remarkable operation, and I was surprised with the exposure of the parts and the ease with which the ureters were isolated and freed from the connective tissue. I was surprised, too, at the amount of pelvic tissue that it was possible to remove through the vagina. In doing the vaginal operation there is no possible opportunity of removing the pelvic glands, and cases have been reported by good authority where pelvic glands have been removed and the patient remained well beyond the five-year period. These cases would certainly have been lost if a vaginal operation had been performed. Of the two, there is no doubt that the vaginal operation is the more difficult one to perform, and it would require considerable experience before one could do the operation as thoroughly as it is done in Schauta's clinic. I would reserve the vaginal operation for very fat women, when the Wertheim operation would be associated with special risk, or in the cases with complete prolapse.

I have had no personal experience in the operation as described by Dr. Werder, but it does not seem to me that it can compare with the operation as described by Professor Wertheim. His statistics, of course, are very fine and I doubt if there is another operator in this country who has such a large percentage of cures at the end of five years, even when we consider his low percentage of operability. When we consider the different steps of an hysterectomy through the abdomen, the infundibulopelvic ligament and the round ligament are divided at such a distance from the growth that it is immaterial whether they are divided with the cautery or with the scissors. Recurrence rarely occurs there. The part that is most likely to be the seat of a recurrence is in the cellular tissue at the side of the cervix. Certainly the Wertheim operation, where the connective tissue is removed out as far as the pelvic wall, removes

more tissue than is removed or affected by the heat of the cautery. In the more advanced cases, where it would be necessary for Dr. Werder to dissect free the ureters in order to apply the clamp, either he must do what is done in the Wertheim operation, that is, dissect first with the scissors, or else he does not get as far away from the disease as is done in the Wertheim operation. In certain of the advanced cases it would be impossible to apply the cautery clamp at all, and these are evidently considered inoperable by Dr. Werder, although they might be undertaken by one doing the Wertheim operation, as his percentage of operability is decidedly lower than that of men who favor the Wertheim operation. He, of course, does not consider the pelvic glands at all. It was my good fortune last year to see Dr. Werder do one of these cases by his method, and I appreciate the skill with which he did it, and I appreciate the quality of the statistics which he has supplied to us.

The cancer problem as it exists to-day consists of two separate factors. The one is to discover the cause of the condition, together possibly with a serum or other agent that will effect its cure. The other is to use the knowledge which we already have to the best interests of our patients. The former is more directly connected with laboratory work; and although it is more than possible that a clinician may have much to do with the discovery of the cause of cancer, it is not part of our consideration to-night. To-night we are considering how we can best use the knowledge and information that we now possess so that we can accomplish the greatest good to the large number of women who are suffering or who may in the future suffer from cancer of the uterus. The first and most important step is to get the patient at the earliest possible time. It does not make any difference what operation is performed; unless the patient is seen and brought to operation while the disease is in its relatively early stages, there is no chance of saving her life. There is no doubt that the difference in the statistics reported from abroad and the statistics of the American operators is due in part to the difference in the stage at which the case comes to operation. From the figures furnished me from the New York Board of Health early this year, I learned that, of the cases recorded at the Board of Health as having died of carcinoma of the uterus, there had been no operation other than a palliative cauterization in 75 per cent, and in only 25 per cent had there been an hysterectomy. Of these 25 per cent, undoubtedly a large proportion were operated upon, not with any idea on the part of the operator that he was going to permanently cure his patient, but with the idea of prolonging the patient's life or relieving her symptoms. I do not myself believe that even here in New York, where conditions are comparable to those in other large cities, one case in twenty of carcinoma of the uterus is operated upon at a time when there is any real chance of permanently curing the patient. Certainly my own individual experience would not make the percentage higher. If this is true in the city, where we have active hospital services ready to take these cases when we can get them, what must it be in the smaller outlying communities? To get our cases of carcinoma of the uterus earlier, it is necessary that our physicians recognize the importance of the early symptoms and the necessity of a thorough examination when the patients first apply to them. It is also necessary that our women be taught the early symptoms of carcinoma of the uterus, and the fact that an operation is a possible but the only cure, so that they will consult their physicians at once. We are just beginning to teach women at large — partly by lectures, partly by articles in popular magazines, partly through nurses and physicians — to know the early signs of carcinoma of the uterus; but we have not yet done all that we should do, and until we do more we are not going to reach women early enough to affect these statistics. Beyond question, therefore, our most important work is to so inform women at large that they may know the early first symptoms of carcinoma of the uterus, so that they will come to us at a time when it will be possible for us to hope to cure them.

During the past summer, while in Germany and Australia, I saw a number of cases of

carcinoma of the cervix operated upon. I saw two cases where no attempt at removal was made after the abdomen was opened. I saw one case that was comparable in its extent to cases that come under my own observation. All the other cases, six or eight in all, were earlier than most that I see and consider operable, and earlier than those operated upon by such men as I have seen operate on carcinoma of the uterus here in New York. If it is possible for the medical profession in Germany and Austria to so educate their women that they get their cases of carcinoma of the uterus early, then it is possible for us to do so, and we are neglecting our medical duty if we neglect it.

RESULTS AFTER THE WERTHEIM OPERATION FOR CARCINOMA OF THE CERVIX OF THE UTERUS[1]

A Preliminary Report from the Gynecological Clinic of Howard A. Kelly, of the Johns Hopkins Hospital

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ALTHOUGH the radical abdominal operation for patients suffering from carcinoma of the cervix of the uterus was advocated as early as 1895 by Clark and Ries, and in 1898 by Wertheim, before 1900 very few cases had been treated by this method in this clinic. Since 1900, however, in practically all the operative cases, the abdominal route has been employed, and the results here given are based upon such cases from January, 1900, to January, 1912.

TYPE OF OPERATION

Although the original operation still remains the same in its fundamental principles — the wide excision of the uterus with the parametria, and the removal of the surrounding lymph structures en masse — from time to time various modifications have been adopted in order to render the technique more perfect. It does not come within the limits of this paper to discuss these modifications; suffice it to say here that the operation as done in Dr. Kelly's clinic corresponds to that described and practiced by Wertheim.

PERCENTAGE OF OPERABILITY

Inasmuch as we possess no means of determining the absolute progress of the disease, in the majority of cases the decision as to suitability for the radical operation must depend upon the degree of direct extension of the local lesion. Judged by this standard, in the series of cases reported by Cullen from 1893 to 1899 the percentage of operability was 51.7. During the last five years, 125 cases of carcinoma of the cervix of the uterus have been admitted to this clinic. One patient refused operation. Of this number the radical abdominal operation was done in 67 cases, thus giving a percentage of operability of 54.

It is somewhat discouraging to note that, although more than a decade has passed, the percentage of operability has remained practically the same. Great efforts are being devoted to the working out of the operative technique, but unfortunately its successful employment is tremendously handicapped by the failure to recognize the early symptoms. The usual history given by these patients is that they have suffered from irregular bleeding for from seven to nine months, and have submitted to various treatments.

Nevertheless, the incessant campaign, waged more especially by Winter, is bringing forth encouraging results. Is it not time that concerted devotion and earnestness, similar to that used in fighting tuberculosis

[1] Read before the American Gynecological Association, May, 1912.

so successfully, be organized to save these patients, who are otherwise irretrievably lost?

STATISTICS

From January, 1900, till January, 1912, the radical abdominal operation has been performed in 136 cases; of this number, primary death occurred in 28 cases, giving a total primary mortality of 20.5 per cent. During the last five years, 125 cases have been admitted, out of this number the radical abdominal operation has been done in 67 cases. Primary death occurred in 8 cases, giving a primary mortality of nearly 12 per cent.

In 70 cases a period of five or more years has elapsed; of these patients, 61 have been traced and 9 lost track of; one patient died two years later from pneumonia; 14 are alive and well; while the remainder gave practically unmistakable evidence of recurrence. The percentage of permanent cures, based upon the number of cases in which the complete operation was done, excluding those lost track of, is 23.3 per cent. While granting that those 9 patients lost track of died from a recurrence, the percentage of permanent cures is 20.3 per cent. Of these 70 cases, primary death occurred in 20. Hence, if we deduct from the total number of cases operated on the number of primary deaths (20), the number dying from other causes (1), and the number lost track of (9), we get a percentage of cures in 35 per cent of the cases.

PROCEDURES TENDING TO LOWER PRIMARY MORTALITY AND MORBIDITY

The primary mortality, comparatively speaking, has been universally high; chiefly because, owing to their generally weakened condition, the patients were unable to stand such an extensive operation. Primarily, as in all operations, the first duty of the surgeon should be directed to the immediate results to the patient, since there can be no consolation in the much-quoted remark, "The operation was successful, but the patient died." Hence, any procedure which will lessen the time required for the operation, the immediate shock, and yet guarantee the same thoroughness, should be employed in every case.

1. *Disinfection of the growth.* Although it is doubtless impossible to render the carcinomatous area aseptic, there is much to be gained from proper measures along these lines. For several months the following technique has been employed here:

a. The usual perineal and vaginal cleansing—soap and water, bichloride of mercury (1:1000), and alcohol, 70 per cent.

b. Thorough cauterization of the primary growth with "soldering irons" or the Paquelin cautery.

c. The application of benzine-iodine solution (1:1000 iodine) to thoroughly dehydrate the field.

d. The application of tincture of iodine (3.5 per cent).

e. An iodoform gauze pack placed in the vagina.

After a thorough cauterization of the growth, the cervical canal should always be dilated. Occasionally this procedure brings to light the existence of a pyometra, which is an absolute indication for postponement of the operation.

As yet the series of cases treated in this manner is too small to warrant conclusions, but it is of interest to note that none of these patients has subsequently developed peritonitis.

2. *The incision.* In all these cases a long midline incision has been employed. In very fat patients, the resection of an ovoid area of skin with the subcutaneous fat in the midline (horizontal lipectomy) has been found to be of great advantage. By this method the depth of the field of operation is reduced by from 5 to 7 cm., and the ultimate result adds greatly to the general personal comfort of the patient.

3. *The catheterization of the ureters.* Although the use of ureteral catheters has not been followed uniformly, there has been no hesitancy in their employment. With the greater facility of catheterization incident to the improvement of cystoscopic technique, this procedure can be carried out within a few minutes before the general anæsthetic is given, and will prove to be of the greatest

possible assistance during the course of the operation. It is especially satisfactory in obese patients, where the exposure is difficult, since it lessens the time necessary for the isolation of the ureters and renders comparatively easy the control of hæmorrhage from the vaginal plexus of veins, which in many cases is the most troublesome part of the entire operation.

From a study of our cases we are led to conclude that the liability to ureterovaginal fistulæ, or secondary infection of the urinary system, is not increased by this procedure. However, the following cautions should be observed:

a. The minimal amount of manipulation, with least possible trauma, is to be exercised.

b. The ureteral sheath should not be disturbed at any point.

c. The catheters should be removed when the ureters are completely isolated, and further manipulations should consist in rolling the ureters over, with the least possible disturbance to their blood supply.

4. *The lymphatic glands*. As it is generally conceded that the lymphatic glands are implicated in from one third to one half of all operable cases, and since we have no means of determining that involvement except by microscopic examination, theoretically speaking, the ideal operation would include their resection in all cases. However, the present operative facilities and technique do not justify such an extensive operation, on account of the great increase in the primary mortality following such a procedure. Hence, for many years no attempt at removal of the lymph structures other than those of the parametria has been made.

5. *The resection of the vagina*. After the thorough dissection of the parametrial and vaginal tissues to a point well below the extent of the growth, they are resected, after the vaginal canal has been swabbed out to remove any infected accumulation. With a thorough preliminary cauterization, the widest possible resection, with probably the least risk of immediate danger to the patient, is obtained by the use of sharp dissection.

6. *Pelvic closure*. As in all abdominal operations, denuded areas should be closed over as completely as is permissible. By this step of the operation the liability of postoperative intestinal obstruction is reduced and the injury to the ureters greatly lessened.

On account of the possible infection present in all cases, some form of pelvic drainage is to be advised. In this clinic the most satisfactory drainage has been obtained by a small cigarette drain, composed of gauze surrounded by rubber protective, placed through the vaginal opening.

7. *The postoperative treatment*. Aside from the general measures for combating shock, there are many procedures which may contribute to a smooth convalescence. The excessive trauma to the bladder walls almost invariably causes temporary vesical paralysis, and formerly it was not unusual to catheterize a patient from thirty to forty times. For the last eight months the preoperative treatment has been varied, so that all patients have water forced until they go to the operating room. This, together with the forcing of liquids practically as soon as the patient becomes conscious, and the administration of salt solution by the rectum and by infusion, has reduced the number of necessary catheterizations very markedly. Patients who have been subjected to a definite injury to the bladder are, however, catheterized more frequently, to prevent overdistention, and occasionally a retention catheter is left in the bladder for a few days. As far as possible, the immediate comfort of the patient is to be sought. Probably no one factor contributes more to this end than the employment of the Fowler position. For several years, in the care of these patients, the Gatch bed has been employed, by means of which they can occupy the sitting posture. The following advantages are to be gained by such a position:

1. Pelvic drainage is facilitated, with limitation of the infection to the pelvic peritoneum.

2. Nausea and vomiting are decreased.

3. Respirations are performed more easily, since the pressure from the distended abdominal viscera upon the diaphragm is greatly lessened.

4. The liability of postoperative pneu-

monia is greatly decreased by frequent modification of this posture.

CONCLUSIONS

From a study of the cases treated at the Johns Hopkins Hospital, the following conclusions are drawn:

1. The extensive abdominal removal of all uterine cervical carcinomata is justified where there is any hope of complete excision.

2. An exploratory laparotomy is often necessary to determine whether or not a case is operable.

3. The preliminary catheterization of the ureters is a valuable aid, especially in fat patients, and does not necessarily increase the probability of fistulæ or secondary infection of the urinary tract.

4. Preliminary cauterization and disinfection of the primary growth is advisable in all cases.

5. A horizontal lipectomy in obese patients decreases the depth of the field of operation and shortens the time necessary for its completion.

6. All patients should be kept in the Fowler position for several days, unless this is otherwise contraindicated by symptoms of surgical shock.

7. By improvements in the technique of the operation, the primary mortality has been decreased from 28.5 per cent for the first seven years to 11.7 per cent for the last five years.

8. Aside from the discovery of the etiological factor of carcinoma of the cervix of the uterus and its successful elimination, the greatest hope lies in the early recognition and wide excision of the primary growth.

INTRATRACHEAL ETHER ANÆSTHESIA[1]

1400 CASES FROM 22 SURGICAL CLINICS

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INTRATRACHEAL anæsthesia, though a familiar term now to those who have employed this interesting method in surgical clinics, is nevertheless deserving of a brief description to those unfamiliar with it.

A small 22F tube is passed through the mouth, larynx, and trachea to the bifurcation of the bronchi. Ether vapor is then forced under constant moderate pressure through this tube, escaping around the tube. Intratracheal anæsthesia is not necessarily intratracheal insufflation; and it is a mistaken idea (though a common one) that intratracheal anæsthesia is of necessity attended by cessation of the respiratory movements. If the escape of vapor is diminished by using a larger tube and restricting the unoccupied space in the trachea, and if the entering fumes are accompanied by an increased volume of air, a condition of apnœa may result. This is permissible and sometimes unavoidable in thoracic operations with wide-open pneumothorax. In intratracheal anæsthesia, however, it is preferable to preserve the respiratory movements, inasmuch as they serve as one of the best guides to the depth of the anæsthesia in this particular method.

The first account of animal experiments performed with the employment of this method, I published in 1898, thanks to the encouragement and suggestions of Professor Cannon of the Harvard Physiological Laboratory. The entire credit for developing the method along physiological lines in an admirable series of observations, and for introducing it to surgery, is due to Meltzer, Auer, Elsberg, and Quinby.

By the instigation of Dr. F. B. Harrington I was given the opportunity to construct an apparatus for use at the Massachusetts General Hospital, and through his courtesy

[1] Read before the Massachusetts Medical Society (Suffolk District), October 26, 1912.

and that of other members of the staff I have employed the method clinically in a series of 70 cases.

A time is always reached in the development of any new method when the experiences of a considerable number of operators must be accumulated, from which deductions may be drawn as to the safety, applicability, and usefulness of the method in question. Intratracheal anæsthesia has been employed clinically for four years. The experiences and deductions of any one administrator may well be open to question. For this reason I was reluctant to base my paper upon a series of 70 cases, lest I be credited with undue enthusiasm and with conclusions biased by a complete absence of unfavorable sequelæ following the use of an apparatus of my own construction. And I may say at this point that this paper is not a discussion of the comparative perfection of different forms of apparatus. It is true that all of the machines constructed for this purpose which have been thoroughly tested have produced, generally speaking, equally good results. Our interest is rather in the anæsthetic method itself than in the design of apparatus.

In order to accumulate sufficient data from which to draw definite conclusions I employed the following method. Writing to fifteen friends who are employing intratracheal anæsthesia, I enclosed twelve questions regarding their experiences. Each was requested to send the names of others in his vicinity employing intratracheal anæsthesia, and to these in turn the questions were likewise sent. The courtesy with which these thirty-five surgeons and anæsthetists have responded to my inquiries has been most gratifying. Twenty-two of the leading surgical clinics in the country are represented, in addition to a number of private clinics. Were you to know the sources from which this material is collected, you would agree with me that it may justly serve as a basis for rational deductions.

The series thus obtained includes 1402 cases in which intratracheal anæsthesia was employed. It should be borne in mind that a considerable proportion of the operations were of the type generally associated with high mortality, including the more serious thoracic operations and surgical procedures about the head, neck, and pharynx. In this series of approximately 1400 cases, seven deaths occurred. In one of these the surgeon reports that he is inclined to credit the death (from broncho-pneumonia) to the intratracheal anæsthesia, inasmuch as at autopsy the infection appeared to have started from the bronchial mucosa. In a second case death occurred following emphysema, in which it is stated that a rupture of the lung occurred as a result of the tube being forced by an assistant who was holding it into one of the main bronchi. The apparatus was not fitted with a safety valve, and the tight fit of the tube in the bronchus prevented the escape of air around it, resulting in overpressure unreleased. In a third case death occurred five hours after resection of the superior maxilla for malignant tumor. Death occurred in the fourth case on the third day after amputation of the tongue. A fifth death, on the eighth day, from pneumonia following laryngectomy for carcinoma, is recorded. The sixth fatal case, of pleuropneumonia, followed a thoracotomy for cancer of the œsophagus. Death followed pneumonia in a seventh case, after an operation for some septic process not described.

The one case of broncho-pneumonia in which the surgeon credits death to the method, and the case of death following rupture of the lung, should doubtless be accepted as induced by intratracheal anæsthesia. The so-called septic case is unexplained. The remaining four fatalities followed operations the severity of which is generally recognized.

In these 1400 cases four additional pneumonia cases are reported, with recovery. In all of these the recorders credit the infection to other causes than the method of anæsthesia. To claim that these pneumonias might also have occurred by other methods of anæsthesia would suggest the form of arguing not uncommon among those who are enthusiastic to prove the harmlessness of a procedure in which they may be vitally interested. I will therefore not attempt to influence you in your deductions as to the source of infection in six cases of post-operative pneumonia out of

1400 administrations of intratracheal anæsthesia.

In reply to the question regarding the occurrence of any complicating sequela to the anæsthesia other than pneumonia or emphysema, only one case was reported, that of aphonia of three days' duration following a difficult intubation with a woven catheter.

Among the 12 inquiries in the circular letter referred to, the questions of postoperative bronchitis, laryngitis, tracheitis, and pharyngitis were raised. Postoperative bronchitis was mentioned in one case only. Eighteen instances of tracheitis and pharyngitis are admitted in this series. With all due respect to the veracity of the several contributors, I am led from my own experience to believe that the low percentage of tracheal and pharyngeal irritation reported results from the fact that the irritation is generally so slight that the patient does not make the fact known. In my own series of 70 cases I made a point of questioning the patient as to this irritation, and not infrequently heard a "scraping" sensation described which the patient generally regarded as insignificant.

May we not conclude from these data that the intratracheal method employed both by skilled and unskilled anæsthetists and surgeons has been attended with less danger than many forms of anæsthesia, and with as few unfavorable sequelæ as with the safest anæsthetic methods?

Furthermore the question arises as to whether, thanks to intratracheal ether, a considerable number of operations in this series did not result more successfully than had they been performed under other forms of anæsthesia. It would be interesting if possible to determine whether the mortality in tongue, jaw, and brain operations in this series had not perhaps been lower than other statistics would indicate, where the mask and cone anæsthesias had been employed. This leads me to mention the so-called advantages of intratracheal anæsthesia.

The intratracheal method provides a constant and uninterrupted supply of fresh air, to which is added a greater or less proportion of ether vapor. Cyanosis can be and is almost always avoided. Poor posture of the patient, drooping of the jaw, falling back of the tongue, or nasal occlusion do not result in obstructed breathing. The entrance and escape of air, thanks to the presence of the tube in the glottis, are uninterrupted.

One would naturally suppose that the presence of a tube in the pharynx and trachea would result in hypersecretion of mucus. On the contrary the opposite is true. A patient anæsthetized by the cone method in preparation for the intubation generally enters the operating room with the pharynx filled with mucus. After the intratracheal tube has been introduced the pharynx is wiped out, and when once clean it remains so through the operation. The air escaping back around the tube tends further to dry the mucous membrane of the mouth and pharynx.

In view of our recent efforts to diminish postoperative shock by every possible means, it cannot be denied that complete oxygenation and lack of cyanosis are factors of importance in reducing shock. Even granting that continued cyanosis throughout an operation may not in itself influence the postoperative programme, the undue muscular exertion of a patient with obstructed air-passages through a long operation unquestionably contributes to the expenditure of energy.

Postoperative pneumonia and pulmonary abscess are not uncommon sequelæ to operations upon the tongue, jaw, and pharynx. Some of these infections are by direct inhalation of septic material. It is a notable fact that the ordinary accumulations of blood and mucus attending one of these operations are prevented from entering the glottis by the air escaping from the trachea. It is reasonable to assume that the avoidance of this inhalation is an added security against postoperative pulmonary complications.

Surgeons who have operated under the employment of this method will, I think, universally agree that the duration of operation is lessened. Operations about the head and larynx under other methods of etherizing are generally interrupted at frequent intervals by allowing the anæsthetist an opportunity to apply the cone in order to maintain anæsthesia. The resulting and constant tendency of the patient to be light in anæsthesia acts

as an impediment to progress, both by the rigidity of muscles and occasional vomiting. By the intratracheal method such interruptions are obviated. With the pharynx partially packed during mouth and jaw operations, retraction of tissues remains permanent, and hæmorrhage is better controlled. A considerable amount of time is thus saved, which is of unquestionable advantage to the patient. Meanwhile, thanks to lack of interruption, the improved hæmostasis and facilitated operative technique favor the final results.

In connection with hæmostasis, it should be mentioned here that, owing to the constant complete oxygenation and relief of respiratory obstruction, congestion of the tissues of the head and neck is reduced. Several operators, in reply to my inquiries, have agreed as to the value of this element in such operations; and those of us who have operated or witnessed operations in these regions under intratracheal anæsthesia have noted a cleaner operative field with less bleeding. Some surgeons have written of their approval of the method in goiter cases, stating that the lack of congestion following the easy breathing has been a contributing factor in the successful outcome of cases.

It may be said, therefore, that intratracheal anæsthesia is the one of choice in operations about the head and neck, including brain surgery. Some surgeons and anæsthetists are sufficiently enthusiastic to believe that this is a form of anæsthesia indicated in operations on other parts of the body. Where nitrous oxide and oxygen are indicated there would seem to be no occasion for intratracheal ether. On occasions where the drop ether method would ordinarily be selected, some of us would prefer to employ intratracheal ether. This is particularly true in the case of plethoric and obese patients where the respiratory passages are not infrequently obstructed during deep anæsthesia; such patients, we not uncommonly find, are to a greater or less degree cyanotic during long operations. Suprapubic prostatectomies and female pelvic operations performed in a marked Trendelenburg position are often attended with cyanosis, despite well-applied drop ether and the introduction of nasal tubes. Granting again that cyanosis from the standpoint of anoci-association is a factor in post-operative shock, the intratracheal method is indicated in such operations.

As in spinal and intravenous anæsthesia, the question which we must decide is whether the history of intratracheal insufflation would contraindicate its use in all but that group of cases about the head and neck to which we have referred. I am of the opinion—and I shall listen with interest to the discussion regarding this opinion—that the reports from 1400 cases have been sufficiently satisfactory to indicate that intratracheal anæsthesia is as safe a method of ether anæsthesia as we have at our disposal, regardless of the seat of the operation. I have ceased to believe that one is not justified in inserting an intratracheal tube unless there is a particular indication for its use. This cannot justly be said of spinal anæsthesia, for instance, inasmuch as it may be argued that in a certain number of cases post-operative accidents have occurred which would doubtless have been obviated by ether anæsthesia. I am not satisfied that this is true of intratracheal anæsthesia, and I fail to find any argument against its general use provided the operator prefers to employ this method.

Those of us who have managed intratracheal anæsthesia during general surgical operations are universally impressed with the ideal conditions which exist. The patient appears to be under a hypnotic rather than an anæsthetic. Pulse and respiratory records during long operations show very slight oscillations from the normal. One sees none of the usual changes from quiet to stertorous breathing commonly accompanying the variations in the course of an ordinary ether anæsthesia; and inasmuch as the factors in administration all remain constant, the respiratory and circulatory functions of the patient appear to be equally unvarying. I believe that this constancy is an element in reducing post-operative shock.

The use of intratracheal and pharyngeal ether with the help of apparatus has in the past two years demonstrated that mechanically applied ether produces an entirely new form of anæsthesia; and it is a question whether

it is not showing us that we have hitherto underestimated the best anæsthetic properties of ether. The air supply remains constant, as it is driven from a rotary pump, and the amount of warmed ether vapor allowed to enter the mixture need not be altered after the first ten minutes until within fifteen minutes of the end of the operation. A light mixture steadily supplied keeps the patient constantly on the verge of "coming out"; but at the same time completely relaxed. The anæsthesia in a way resembles what might be described as a continued primary anæsthesia. The length of the operation under a given mixture, arranged early in the operation as best suited to the patient in hand, does not apparently influence the depth of the anæsthesia, although the mixture remains constant throughout. In other words, the patient's immunity from the given dose of ether does not materially increase or diminish in the course of an hour's administration.

The total quantity of ether given is distinctly reduced, and I recall one case of my own series in which six ounces was sufficient for an operation lasting two hours and a quarter. In skillfully applied intratracheal anæsthesia the amount of ether is reduced to that required in ether anæsthesia by the rebreathing method; and the omission of the rebreathing element must be admitted to be of advantage, because of the lack of tendency to incomplete oxygenation.

It must be remembered that intratracheal anæsthesia as such was an accidental discovery in the course of experimental surgery of the thorax under intratracheal insufflation. It was discovered that, in the presence of wide openings in both sides of the thorax, oxygenation of the blood could be maintained by a constant supply of fresh air delivered through an intratracheal tube at the bifurcation of the trachea. Even with all accessory respiratory movements excluded by the administration of curare, the air exchange in the pulmonary alveoli was yet sufficient to prevent an excessive accumulation of carbon dioxide. In other words a new and simple method was discovered of preventing the dangers of pneumothorax during thoracic operations. Obviously it was necessary to add ether to the insufflating air, and the anæsthesia thus produced was in itself so satisfactory that intratracheal anæsthesia has come to be employed as such in operations other than thoracic.

Experience with negative pressure, positive pressure, and insufflation has demonstrated that less than 5 per cent of routine chest operations require any mechanical aid to the respiratory functions. In this 5 per cent of chest cases insufflation is doubtless the preferable method. In the remaining 95 per cent, although opening the thorax is of no danger in itself, the intratracheal method of anæsthesia is unquestionably the ideal one. In my own experience of approximately 130 thoracic operations I have employed no form of anæsthesia comparable to this. Dr. Freeman Allen has frequently demonstrated to me the value of anæsthol, ether, and chloroform, interchangeable, and skillfully employed. Despite the limited lung function generally present, as in a case of chronic empyema, Allen has by such selective anæsthesia prevented cyanosis. And yet intratracheal anæsthesia in these routine chest cases is even nearer ideal. The operation may place the patient in an apparently cramped position in order to render a portion of the thorax more accessible. The intratracheal apparatus may be so adjusted that a certain degree of insufflation results, improving the tidal air and preventing cyanosis and dyspnœa. If in the course of a routine thoracic operation it is discovered that the lung is less adherent than presupposed, and mechanical aid to respiration is indicated, the intratracheal tube, being already in place for anæsthetic purposes, is now adjusted to provide insufflation and the dangers of pneumothorax are rapidly overcome.

Another advantage is offered by the presence of the tube in cases of acute and subacute empyema. With a finger in the thoracotomy wound, the lung may at will be partially inflated, thus indicating whether it is yet mobile or is held by adhesions which should when possible be broken up to prevent the occurrence of chronic empyema. The introduction of a tracheal tube therefore is the indicated procedure in all thoracic cases.

whether of the 5 per cent of cases requiring insufflation or of the remaining 95 per cent in which anæsthesia alone is indicated.

Post-operative nausea and vomiting are admittedly factors in increasing the total destruction of brain cells attending any operation. In my circular letter the following question was included: How great, in your experience, is the extent of nausea and vomiting with intratracheal ether compared with that following ether anæsthesia by well applied drop methods? Answer, More; less; the same. One third of the writers answered that the degree of nausea and vomiting in intratracheal ether is the same as in the drop method. Two thirds replied that it is less than in the drop method. I may add that in my own experience the degree of nausea has been the same in both methods.

A word about certain features in the technique of the intubation. It is clear to me that all surgeons should become familiar with some form of technique of introducing an intratracheal tube: first, in order that they may use the method when intratracheal apparatus is at hand, but when there is no one familiar with intubation; second, in order that tracheotomy may become less common in certain emergencies. On one occasion I could not refrain from suggesting this to a throat surgeon. An œsophageal speculum, from prolonged usage, had pressed upon the trachea and caused serious cyanosis. With œsophagoscopes, bronchoscopes and Jackson specula at hand, he was on the point of doing tracheotomy. The intubation was performed skillfully and with immediate relief.

Some of those present here have been important contributors to the technique of intubation. There are three methods: the epiglottis may be raised with the left forefinger and a soft rubber tube guided to the glottis by a hollow metal introducer, as suggested by Cotton; an illumination speculum may be introduced, providing direct vision of the laryngeal opening through which the tube is passed; a braided tube or a rubber tube with stilette contained may be passed by sense of touch directly into the larynx. The circulating letters brought responses to a question regarding the choice of these methods as follows: Soft rubber tubes of the Quinby type have been employed by approximately one half of the correspondents. The remainder have used a braided catheter or a stiletted rubber catheter. An equal number have utilized the hollow introducer and the direct vision methods.

Eynard has recently constructed for me an intratracheal catheter with two side eyes and a blind cup at the tip which receives the olive shaped end of a steel stilette. I have found it very satisfactory. Originally I used with like success the Cotton introducer and the Quinby tube. If, however, a stilette tube is equally efficient, I regard it as simpler and requiring less skill than the use of introducer or speculum. The general surgeon should be prepared at least to intubate with a stiletted catheter. The trained anæsthetist should be familiar also with the introducer and the Jackson speculum.

I present, therefore, the following conclusions for your discussion.

Intratracheal anæsthesia is a safe method; it is the anæsthesia of choice in operations about the head and neck and thorax. The mortality from such operations should be reduced by the use of intratracheal ether.

There is no contraindication at present to its employment in any surgical operation.

There are sufficient reasons for stating that operative shock is diminished and that the post-operative recovery is rendered less exhausting in all operations.

All recorded forms of apparatus and the several methods of intubation are successful and require but little technical skill for their employment.

NOTE.— I have not mentioned the names of the surgeons and anæsthetists who contributed to the data upon which this paper is based, because in requesting them to answer the questions of the circular letter I indicated my intention to omit the names of clinics and of individuals. Nevertheless I would express my sincere gratitude to these men for their contributions to this series of cases and for their courtesy in responding so promptly to my inquiries.

SEMINAL CALCULI SIMULATING NEPHROLITHIASIS

By C. S. JAMES, M. D., and J. W. SHUMAN, M. D., Centerville, Iowa

THAT calculi of the seminal vesicles is a rare condition, is evidenced in a personal communication from Eugene Fuller, who has performed not less than two hundred and forty vesiculotomies. He states, "stone in the seminal vesicles *must* be very rare," and cites having met with but two cases in his experience, and one of those not definite.

Belfield (personal communication) states, "that organic concretions with lime salts, not exceeding buckshot in size, are not uncommon in the vesicles, and that he has encountered them in two cases of vesiculotomy." Furthermore, he states, "that concretions exceeding that size are quite an unusual occurrence." And again (*J. Am. M. Ass.*, liii, No. 26), "the intimate relation between the juxtavesical ureter and the seminal duct seems, therefore, responsible for considerable kidney and ureteral disease hitherto unexplored. Renal pain, 'lumbago' or 'nephralgia,' often occurs when the vesicle is distended."

Disque, of Pittsburgh (personal communication), reports having seen no cases with operative or post-mortem proof, but refers to cases of vesiculitis simulating to some extent renal calculi.

P. J. McHugh[1] makes reference to concretions or calculi sometimes occurring in the vesicles of the aged, the only symptom referable to them being colic, and this infrequent. Reliquet first described this symptom, in 1879, as spermatic colic occurring at the time of an ejaculation. The pain, he states, is felt at the neck of the bladder, radiates upwards or down to the testicle, is sharp, and, reflexly, may produce nausea. The pain is due to the obstruction of the duct by a concretion of inspissated semen, and, as a result of the obstruction, the emission may be deficient or fail altogether, in which case, the colic may endure for a few minutes.

Casper[2] gives the best description, describing as a rare case seminal calculi growing as large as a cherry stone so that they may completely occlude the ejaculatory duct. Their number may be numerous. He supposed their formation to be due to stagnation of secretion in the vesicles, occurring in advanced age, though it may take place at an early period in life when inflammatory processes have narrowed the lumen of the ejaculatory duct, so that there is an impediment to the outflow of semen.

The calculi give rise, not infrequently, to pain upon micturition and defecation. In a case where there is suspicion of seminal calculi, an attempt should be made to palpate the vesicles.

Keen[3] states that calculi of the seminal vesicles are usually only found post-mortem, often give rise to no symptoms, are as a rule soft and easily crushed between a sound in the bladder and finger in the rectum.

Tuholske[4] states that inflammatory diseases of the seminal vesicles are undoubtedly of frequent occurrence. Their close proximity and connection with the prostate makes posterior urethritis a prolific cause of vesiculitis which is most often mistaken for prostatitis, the chief symptoms being pain referred to the peritoneum, the groin, the lower rectum, and the lumbar region, associated with defecation, and painful and frequent micturition.

Zeissel holds that "there is one symptom indicative of inflammation of the seminal vesicles, viz., erections which are almost constant and so painful as to constitute priapism. With the urine, blood and sometimes pus are evacuated, and seminal fluid escapes at stool." Examination per rectum reveals two elongated swellings by the side of the prostate running upward and outward at the base of the bladder. This inflammation may terminate in pus formation or peritonitis; or becoming chronic terminate in atrophy or permanent dilatation with the formation of concretions.

[1] Colorado Medicine, Dec., 1911.
[2] Casper's "Genito-Urinary Diseases."
[3] Keen's "Surgery," iv.
[4] International Text-Book of Surgery, ii.

Henry Morris[1] briefly mentions that tubercles, abscesses and stones in these organs may give rise to symptoms which resemble those of renal calculus.

That calculi in the seminal vesicles may present the definite clinical picture of renal stone may be satisfactorily explained by an exhaustive study of the nerve supply, which, summed up, may be briefly stated as follows: Irritation from seminal calculi can be transmitted to the respective kidney or lumbar region through, first, either the vesicle or prostatic filament of the inferior hypogastric or pelvic plexus to the hypogastric plexus, hence through the gangliated cord to the lumbar ganglia and either to the lumbar vertebræ and their ligaments (lumbago), or on through the aortic plexus, aortic-renal ganglia and renal plexus to the kidney substance (nephralgia); second, can be transmitted through the deferentia plexus, via short route to the gangliated cord; third, the efferent filaments of the deferentia plexus and the genitocrural nerve to the lumbar region; fourth, irritation may travel through the vas deferens filament of the pelvic sympathetic, the spermatic artery filament of the spermatic plexus and its numerous filaments to the renal or lumbar ganglia. Thus may be produced, by any one of the several routes, referred pain and tenderness.

A thorough investigation of this subject both by literature, reference and personal communications, has failed to procure any operative or post-mortem proven cases to report other than the following:

CASE 2639, Mr. T. E., aged 33, married four years, one child living and well. No children dead. First examined October 6, 1910, and found suffering from apparent right renal colic as evidenced by severe right-sided pain, rectus rigidity, frequent micturition, pain referred to penis and marked pain on palpation of the right kidney.

Urinary examination: Chemically, negative; microscopically, few erythrocytes, epithelium and phosphates. Case diagnosed as probable right renal calculi and yielded to usual hypo of morphin. Two days later, the patient passed by urethra what he described as a "slug," which was a blood-covered irregular calculus about the size of a grain of field corn.

Physical examination at the time revealed a tender right kidney on palpation. Labor or forced exercise excited pain in the right flank. Patient emphatically denied specific history.

Rectal examination evidenced a firm, non-painful prostate; the vesicles not palpated. Patient returned to his work, but complained of continued discomfort and pain in his right side all summer; when, on November 10, 1911, he again consulted and physical examination evidenced the same findings as before.

Blood examination, W. B. C., 7600; R. B. C., picture normal. Hæmoglobin 80, blood pressure 110. Nephrotomy advised and accepted.

November 11, 1911, under ether anæsthesia, through a lumbar incision, the right kidney was sectioned and no stone present. Ureter patulous. Incision closed and the kidney drained by a sutured cigarette drain. Convalescence uneventful until removal of drain on seventh day, following which urine became bloody, patient later passing vermiform clots from the bladder. Urine stained out many gram negative diplococci, intra and extra cellular, and then it was, upon direct questioning, ascertained that the patient had suffered from gonorrhœal infection fourteen years previous, with *a right-sided orchitis*. Urine was thoroughly worked out per antiformin method, no tubercle bacillus found. General condition continued to grow worse due to the acute hæmorrhagic anæmia and cystic tenesmus due to blood clots contained therein.

Blood examination: Hæmoglobin, 30; R. B. C., 3,200,000; W. B. C., 10,000. Poikilocytosis and a marked aniscytosis.

Death December 16, 1911, clinically from acute anæmia due to hæmorrhage from the right kidney.

Autopsy December 16, 1911, by Dr. J. W. Shuman, revealed the following findings: Right kidney's pelvis filled with blood clots, one extending well up toward the cortex and continuous with an old patulous suture hole. Cortex evidenced an unhealed opening continuous with the superficial drainage tract. Left kidney negative, ureters clear, bladder empty. Ureteral openings patulous. Mucous membrane of the cystic wall, with the exception of pale appearance, shows no change. Prostates not enlarged and of normal consistency. Vas deferens evidenced no change.

Seminal vesical walls hypertrophied. Four calculi removed from the right vesicle, situated near the fundus, dull white in color and faceted, ranging in size from that of a grain of popcorn to that of field corn. Seminal fluid stained out many gram negative diplococci.

Chemical analysis of calculi yielded phosphate and carbonate of lime 85 per cent, organic matter in which spermatozoa were found 15 per cent.

Pathological diagnosis:

1. Pernicious anæmia secondary to hæmorrhage.
2. Suppurative hæmorrhagic nephritis of the right kidney.
3. Chronic seminal vesiculitis with calculi formation (dextra).
4. Chronic Neisserian infection.

[1] Surgical Diseases of Kidneys and Ureter, vol. ii.

RESULTS OF THE RADICAL ABDOMINAL OPERATION FOR CANCER OF THE UTERINE CERVIX[1]

Report of 25 Cases

By JOHN A. SAMPSON, M. D., Albany, New York

MY early experience with this operation was while resident gynecologist at the Johns Hopkins Hospital, in the clinic of Dr. Howard A. Kelly, and the cases which I operated upon there through Dr. Kelly's courtesy belong to the records of his clinic and are not included in this report.

Since leaving Baltimore in the spring of 1905, I have operated upon twenty-five patients for cancer of the cervix, by the radical abdominal operation. Some of the pelvic lymph nodes were removed at twelve operations, and these were examined microscopically in all but one instance—unfortunately a node from one case, which in the gross apparently contained cancer, was lost. Metastases were found in one or more nodes in seven of the twelve cases (eight, if the one lost is counted as positive). We therefore know that at least seven of the twenty-five patients had metastases in one or more of the pelvic lymph nodes at the time of operation.

Five died as the result of the operation, and four of these were advanced cases: in one (Fig. 1), the trigonum of the bladder and lower ends of both ureters (double ureter on one side) were resected; in another, a portion of the right external iliac vein was excised for the extension of cancer about it from a metastasis in an iliac lymph node (similar to the condition shown in Fig. 4); in another, several large cancerous lymph nodes, including a large lumbar node, were removed; in another, a portion of the bladder was excised. The fifth was less extensive than the above, but the patient was in feeble condition. One of the five patients died a few hours after the operation, and the other four died from four to seven days afterwards. All five apparently never completely rallied from the shock of the operation. In my experience, the operation in the favorable cases is attended with a very low primary mortality (in fact, I have not yet had a fatality in this group). The high primary mortality has occurred in the "border-line" and the advanced cases, where the growth is more extensive, requiring a more difficult operation, and the resistance of the patient is lower than in the early cases. This would emphasize the importance of not operating on the latter patients, were it not for the fact that some of them do survive the operation and may be relieved for a time, and even occasionally cured. With experience we will learn to discriminate what patients should not be operated upon. It is very hard for me to refuse to operate on an unfavorable case if I believe I can remove the entire growth, and it is also difficult to stop during the operation until I think I have. Only one instance of ureteral fistula occurred, from interference with the blood supply of the ureter, in the twenty patients surviving the operation, and this closed spontaneously. By leaving the ureter attached to the peritoneum above the base of the broad ligament and freeing the parametrial portion carefully from its sheath, the dangers of necrosis are slight.[2]

The End Results (Five Years' Limit)

Eight of the twenty-five patients were operated upon over five years ago. Two of these died as the result of the operation, and two died later from recurrence. Four are clinically free from cancer at the present time, i. e., four of eight cases operated upon and of six surviving the operation.

The Two Cases Dying from Recurrence.

Both were young women, aged 30 and 32 years, who had never had children. Both

[2] For discussion of this phase of the subject, see Johns Hopkins Hospital Bull., April, 1904, and J. Am. M. Ass., Sept. 10, 1904.

[1] Read before the American Gynecological Society, May 29, 1912.

Fig. 1. Advanced cancer of the cervix, inverting type, arising within the cervix. Photograph of a stained (hæmatoxylin and eosin) median sagittal section of the uterus (natural size). Compare with Figs. 2 and 3. The growth had invaded the bladder anteriorly, including the intramural portion of the right ureter and the parametrium about the left ureter, which was double; it had also invaded the body of the uterus. A small myoma is present in the fundus. The trigonum of the bladder and the lower ends of both ureters were resected. The patient died on the fourth day. The operation in this group of cases is attended with a high primary mortality and very little chance of a cure. Of nine cases in which I have resected one or both ureters and a portion of the bladder, four have died from the operation and the growth has recurred in all who survived, though two were clinically free from cancer for two years.

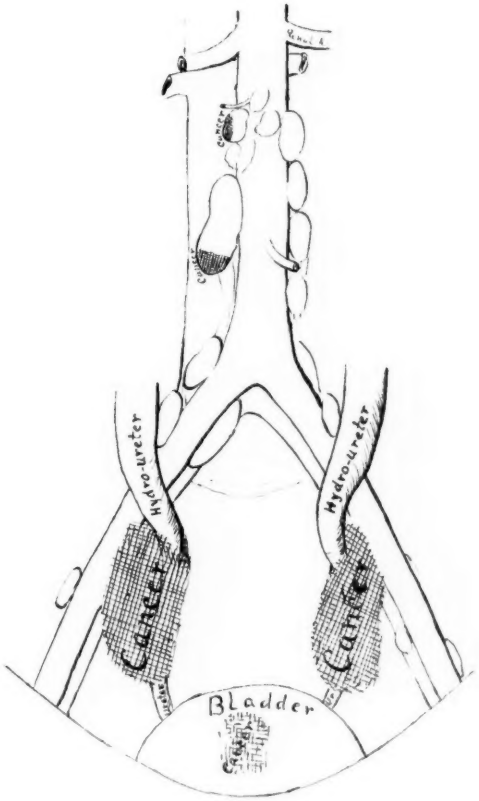

Fig. 2. "Recurrence" found at autopsy in case shown in Fig. 3 (½ natural size). The lymph nodes shown were all studied microscopically, and metastases were found in two abdominal lymph nodes as indicated. Both ureters were compressed by cancer just below where they cross the iliac vessels, from the extension of metastases in the iliac lymph nodes, the nodes most frequently infected in cancer of the cervix and the ones most readily removed at operation. A small recurrence was found in the field of operation between the bladder and the vagina, as indicated.

presented the same type of growth, namely, the inverting type arising from the portio vaginalis (Figs. 2 and 3). Both appeared favorable before the operation: the uterus was freely movable, and the parametrium was apparently free. Pelvic lymph nodes were not removed in the first one. In the second, small parametrial lymph nodes were removed and found to contain cancer.[1] The iliac nodes were not removed. The first one was apparently free from cancer for two years, and died from recurrence a year later. The second died within a year of the operation. The cause of death in each was the same, i. e., renal insufficiency from compression of the ureters by cancer. The symptoms were persistent nausea and vomiting with great loss in weight and strength. An autopsy was obtained in both cases. In the first, there was not any evidence of cancer found in the field of

[1] For discussion of this phase of the subject see previous article by author, The Participation of the Tissues Adjacent to the Uterus and of the Pelvic Lymphatics in Uterine Cancer, J. Am M.. Ass., Jan. 14, 1911.

Fig. 3. Fig. 4. Fig. 5.

Fig. 3. Apparent early cancer of the cervix, inverting type, arising from the portio vaginalis. Photograph of stained (hæmatoxylin and eosin) median sagittal section of the uterus (natural size). Compare with Fig. 1. Patient died three years after operation from "recurrence," in this instance from metastases in pelvic lymph nodes not removed at operation. The parametrium, clinically and microscopically, was free from cancer, and the growth was apparently limited to the cervix. The operation in this group is attended with a low primary mortality (I have not lost a single case). Unfortunately a definite prognosis cannot be given, even when the laboratory findings are favorable.

Fig. 4. Apparent early cancer of the cervix, inverting type, arising from the portio vaginalis. Photograph of stained (hæmatoxylin and eosin) median sagittal section of the uterus (natural size). Compare with Fig. 1. Patient died within a year after the operation (see text and next illustration). The uterus was fixed in the pelvis by adherent tubes and ovaries, but the parametrium, clinically, was free from cancer. On the other hand, metastases were found in small parametrial lymph nodes. The laboratory findings gave an unfavorable prognosis.

Fig. 5. Apparent "border-line" cancer of the cervix, inverting type, arising from the portio vaginalis. Photograph of stained (hæmatoxylin and eosin) median sagittal section of the uterus (natural size). Patient clinically free from cancer, nearly seven years since the operation. By comparing with Fig. 2 it can be seen that the primary growth is more extensive. While the parametrium felt thickened before the operation, the microscopical examination of this tissue failed to detect any direct extension of the growth from the cervical tissues or metastases in the small parametrial lymph nodes. A metastasis was found in one of the iliac lymph nodes. See text, Case No. 1 of those apparently cured. Some cases with metastases to the pelvic lymph nodes apparently may be cured. The primary mortality is greater in this group than in the early ones, but not quite as great as the "true border-line" cases as shown in the next illustration.

operation, but the ureters were compressed by cancer, just below the place where they cross the iliac vessels, from the extension of metastases in the iliac lymph nodes. Metastases were also found in two of the abdominal lymph nodes. *The patient died from cancer in accessible iliac lymph nodes not removed at operation.* In the second, a similar condition was found, and in addition a small recurrence in the field of operation between the bladder and vagina (Fig. 4).

The Four Cases Who Are Apparently Cured.

No. 1. Para, aged 46, operated upon in August, 1905. The patient had been curetted a month before I saw her, and her condition had later been diagnosed as "inoperable" by another surgeon. Before operation the primary growth appeared extensive and the parametrium felt indurated. Some of the pelvic lymph nodes were removed and cancer was found in one. The type of growth was inverting, arising from the portio vaginalis (Fig. 5), and locally more advanced than in the previous two who died from recurrence. In spite of a previous curettage, an extensive primary growth with a

Fig. 6.

Fig. 7.

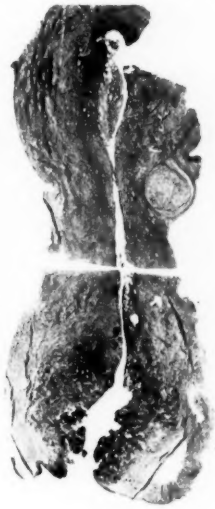

Fig. 8.

Fig. 6. "Border-line" cancer of the cervix, inverting type, arising within the cervix. Photograph of a stained (hæmatoxylin and eosin) median sagittal section of the uterus (natural size). Compare with Figs. 1 and 8. Patient clinically free from cancer, nearly seven years since the operation. Before operation the cervical canal was found to have been converted into a thin shell, lined with necrotic cancerous tissue, and its movements were restricted. The cervix was torn in removing the uterus and the field of operation infected with fragments of cancer. See text, Case No. 2 of those apparently cured. Microscopically, cancer was not detected in the parametrium laterally, but had extended through the anterior wall of the cervix and had invaded the posterior wall of the bladder, a portion of which was removed with the cervix. My primary mortality in this group of cases has been about 20 per cent, and yet some of these may be cured.

Fig. 7. "Border-line" cancer of the cervix, inverting type, arising within the cervix. Photograph of a stained (hæmatoxylin and eosin) median sagittal section of the uterus (natural size). Compare with Figs. 1 and 8. Patient clinically free from cancer, nearly six years since the operation. The growth appeared extensive before the operation, and microscopically it had extended beyond the cervix and invaded the parametrium slightly on each side. A small myoma is situated in the anterior uterine wall. See text, Case No. 3 of those apparently cured.

Fig. 8. Early cancer of the cervix, inverting type, arising within the cervix. Photograph of stained (hæmatoxylin and eosin) median sagittal section of the uterus (natural size). Compare with Fig. 1. Patient clinically free from cancer, over five years since the operation. A polyp is situated in the fundus and a small myoma in the anterior uterine wall.

diagnosis of "inoperability," and metastasis found in an iliac lymph node, the patient is clinically free from cancer at the present time, i. e., nearly seven years since the operation.

No. 2. Nullipara, aged 40, also operated upon in 1905. Before operation the primary growth appeared extensive, the cervix having been converted into a thin shell, and its movements were restricted. At operation the cervix was found to be adherent to the bladder, and in attempting to free the bladder the cervix was torn, the field of operation infected with the necrotic cancerous material, and the specimen removed in fragments. The case was considered unfavorable, and no attempt was made to remove the pelvic lymphatics. The type of growth was inverting, arising within the cervix (Fig. 6). In spite of an extensive primary growth, its removal in fragments, and the infection of the field of operation with cancer, her physician, Dr. C. G. McMullen of Schenectady, informs me that she is apparently cured.

No. 3. Para, aged 43, operated upon in 1906. Before operation the primary growth appeared extensive, though confined to the cervix. Pelvic lymph nodes were not removed. The type of growth was inverting, apparently arising just within the cervical canal (Fig. 7).

No. 4. Para, aged 53. Both tubes and ovaries had been removed five years before for pelvic inflammatory conditions; operated upon by me in April, 1907. Before operation the growth was apparently restricted to the cervix, the uterus was fixed (due to adhesions), causing a diagnosis of "inoperability" to be made by the surgeon who had first operated upon her. Pelvic lymph nodes were not removed. The type of growth was inverting, arising within the cervix (Fig. 8).

The two patients dying from recurrence were both young women, with an average age of 31 years, who had never had children. The type of growth was inverting, arising

from the portio vaginalis, and the cases appeared favorable before the operation; and both died from extension of metastasis in accessible iliac lymph nodes (a small recurrence in field of operation was present in one). The four apparently free from cancer five years or more since the operation (two nearly 7 years) were older women, average age 45+ years; three had borne children, the other had not. The type of growth in three was inverting, arising within the cervix, and one, inverting, arising from the portio vaginalis. Three of the four appeared unfavorable before the operation. In only one were the accessible pelvic lymph nodes removed, and cancer was found in one of these.

These cases are too few in number from which to draw any definite conclusion, but they show that what appear to be unfavorable cases may sometimes be cured, and that it is not safe to give a favorable prognosis in an apparently early case. With further experience, we will learn on what to base our prognosis, such as the origin of the growth—whether from the portio vaginalis or within the cervix; its type—inverting or everting; its histological structure; the age of patient—whether para or nullipara, etc.

I have had the opportunity to obtain autopsies on five patients dying from recurrence (including the two just reported). In three, the immediate cause of death arose from the compression of the ureters by cancer extending from metastases in accessible iliac lymph nodes. In the fourth, there was an extensive local recurrence in the field of operation from cancer not removed at operation (an advanced case). In the fifth, there was an extensive local recurrence filling the pelvis with metastases to the lungs, heart, one kidney, and skin.

Based on my own experience, I believe that metastases are present in from one third to one half of the operable cases, and that while lymph nodes which are not readily accessible may be involved as well as accessible ones, the latter are the ones which are most frequently involved, and sometimes the only ones, and I refer especially to the iliac lymph nodes near the origin of the internal iliac vessels. I therefore believe that these nodes should be removed when the condition of the patient will permit, and especially in the early cases where the operative technique is easy and the resistance of the patient is unusually good.

SKIAGRAPHIC DEMONSTRATION OF VESICAL TUMORS

By HOWARD A. KELLY, M. D., and ROBERT M. LEWIS, M. D., Baltimore

As a rule, tumors of the bladder offer as little resistance to the passage of the X-rays as the surrounding healthy, normal tissues; consequently, no matter how large the tumor, a skiagram made of the unprepared bladder with its contained growth will show neither bladder nor tumor. If the bladder is filled with air, either by catheter with an attached hand syringe or by a catheter in the knee-breast posture, and a radiogram is then taken, the resulting picture will show perfectly the outline of the bladder; but as the tumor offers approximately the same resistance to the X-rays as the surrounding tissues, it will not register on the plate. Were we ignorant of this, how puzzling it might be, first, cystoscopically to demonstrate the tumor, and then to take an X-ray picture and to show a normal bladder outline with no growth visible. Under such circumstances one would almost be tempted to make a diagnosis of "phantom tumor of the bladder."

It is then evident that some foreign medium must be introduced into the bladder to throw the tumor into relief if it is to be seen at all.

In the first case we show here this has actually been done. The condition — a papilloma of the bladder — was recognized cystoscopically. A suspension was then made of bismuth subnitrate with gum tragacanth and

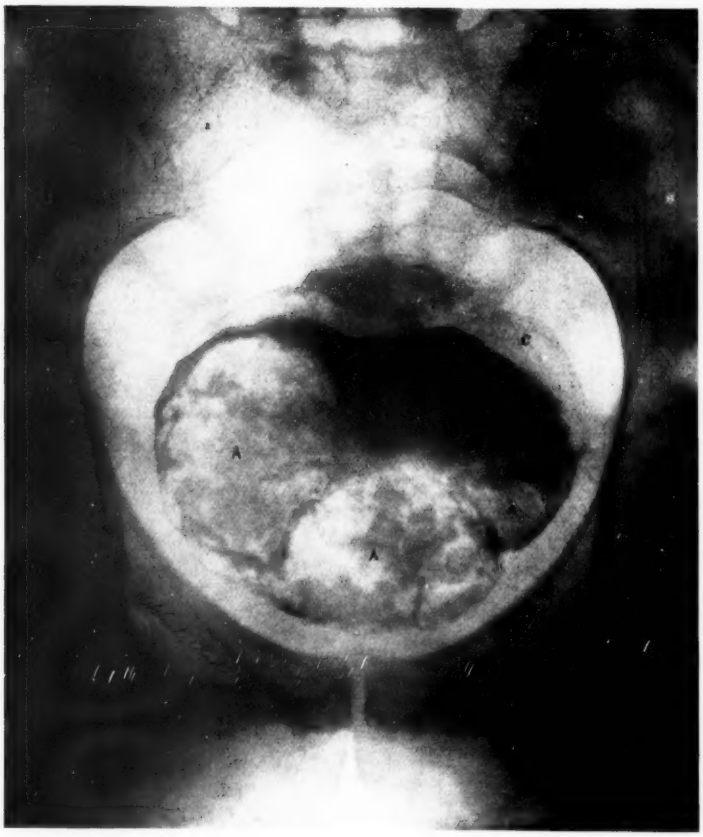

Fig. 1.

water. This was shaken up and rapidly run into the bladder. Fortunately, as later shown, the suspension, which is never perfect, was in this instance a poor one, and the bismuth salt rapidly precipitated. The radiogram was then taken at once.

Looking now at the illustration we discern three well-defined areas, A, B, and C. The area A represents a conglomerate of large growths, showing beautifully the papillomatous nature by the cauliflower-like outlines. The bismuth has evidently settled apart from the mixture, filtering into the crevices and interstices in the surface of the growths, bringing out their characteristic details with astonishing clarity. The tumor mass is separable into three divisions, and more than half fills the bladder in its present state of distention. Note especially that, good as the picture is, a very important detail, the size and situation of the pedicle, is left undetermined. About the tumor is seen a dark zone (B), which evidently represents the injected bismuth suspension. Above this, the gray area (C) is probably the result of the presence of a small amount of urine, water, or air which has accidentally leaked in. A little bismuth has adhered to the apex of the bladder and causes the dark shadow seen there.

In the second case, the diagnosis of papilloma of the bladder was again established by

Fig. 2.

cystoscopy. Instead of using bismuth suspension in this case, the bladder was injected with 40 cc. of a 5 per cent strength silver iodide emulsion. About half the amount injected was then voided. In doing this the patient experienced considerable difficulty as, the tumor directly overhung the internal urethral orifice and, dropping upon it, acted as a ball valve and checked the flow. Part of the silver solution being expelled with the patient still in the dorsal position, the bladder was next distended with air, using a syringe bulb attached to the catheter for that purpose. Here, again, some little difficulty was encountered, as the air tended to leak out around the catheter. By holding the parts together, however, most of the air was retained. The plate was immediately exposed.

The second radiogram also shows three zones, even more distinctly defined than in the previous picture. The large tumor (A) is sharply defined, the growth being, of course, slightly exaggerated. It must be remembered that the size of the shadows in all radiograms depends on two factors: the size of the object taken and the relative positions of plate, object, and X-ray tube. We can, by taking stereoscopic radiograms following Dr. Manges' method of pelvic measurement, determine with accuracy the size of the tumor.

Here we call attention to the fact that the second picture does not give the irregular and

rough outline of the body of the papilloma so well as the first. The reason for this will be discussed later. Notice that a large amount of encircling healthy bladder wall is shown. From the X-ray taken without distention and the media used, or from the cystoscopic picture, in the case of so large a tumor one naturally concludes that the greater part of the bladder wall is involved by the growth. Here, though the tumor is large, one can almost surely say that the only part of the bladder wall involved is that part to which the pedicle is seen attached. Plainly no growths are present outside the area covered by the tumor. We may pretty safely conclude, too, that no other growths of any considerable size springing from separate bases are concealed by the massive growth shown, for were this the case we would almost certainly be able to see at least a small part of the secondary growth jutting out from behind the margin of the large tumor.

Although the picture under consideration does not show the roughness of the surface characteristic of papilloma, there is a most important point not brought out in Plate I, but extremely well shown in the second, i. e., the pedicle (P) of the growth, which is here well defined and comparatively small, being about 1½ cm. in diameter. Its size and situation were later proved by a direct method of measurement. A small hooked instrument was passed through the open cystoscope until it touched the posterior vesical wall. The point on this corresponding with the external orifice was carefully noted. The instrument was then withdrawn until the hook pressed against the surface of the pedicle farthest from the urethra. The handle of the instrument was then measured from the point previously determined to the point now found opposite the shoulder of the cystoscope, and this measurement was, of course, the distance of the pedicle from the posterior bladder wall. Making a note of the last point determined on the handle of the instrument, the hook was disengaged from the pedicle, withdrawn slightly, and then pressed against its anterior surface. The distance between the point on the handle previously noted and the point found opposite the outlet of the cystoscope was 1½ cm., the measurement of the diameter of the pedicle.

The dark shadow B surrounding the tumor represents the silver iodide emulsion left in the bladder. The light zone about this in turn is the injected air distending the bladder. In the second case considered, the clear demonstration of the pedicle is most valuable, and is probably due to the fact that a solution of very high specific gravity was employed. This floated the tumor away from the bladder wall and surrounded it everywhere except at the site of attachment.

In this case it was remarked that the characteristic irregular outline of the papilloma was not demonstrated, this undoubtedly resulting from the thickness and viscidity of the silver iodide solution, which prevented its penetration into the interstices in the surface of the growth. It must be added that direct inspection showed the surface of this tumor not to be as irregular as in the other instance; this fact alone, however, would not account for the lack of detail shown. This case (No. 2) is at present under treatment with the high frequency current. In spite of the large size of the growth, three treatments have almost eradicated it.

To bring out both surface detail and pedicle in our next case, we propose to combine the methods just described, first, injecting into the bladder a bismuth emulsion, or better perhaps, a simple suspension of bismuth subnitrate in water without tragacanth, allowing this to precipitate and coat the tumor, then letting the patient void as much of the solution as possible. The next step will include the injection of 30 cc. of a 5 per cent emulsion of silver iodide, which should float up the tumor and surround the pedicle; and finally, inflation of the bladder with air, as described in Case 2.

A point not previously alluded to is the obvious bearing of the posture of the patient on the position of the tumor. Evidently, if the pedicle is attached to one side of the bladder, leaning in the opposite direction will cause the growth to drop away from the vesical wall to which it is attached, increasing the likelihood of its being surrounded by the fluid injected.

Unfortunately, irritation of the bladder is the rule, especially in the case of vesical tumors of large size. Much discomfort and distress to the patient may be avoided by instilling a 4 per cent solution of novocaine and allowing it to remain in the bladder for ten minutes before beginning the necessary manipulations.

The foregoing description might lead to the supposition that much time must necessarily be consumed in performing the steps recommended. This, however, is not the case, a very few minutes sufficing for the entire procedure.

We would add in conclusion that we are now trying out various preparations of silver iodide for X-ray purposes in vesical, ureteral, and kidney work. We have an unusually good radiogram of the renal pelvis and ureter injected with 5 per cent silver iodide emulsion in a case of ureteral calculus.

The excellent radiograms were taken by H. H. Hart.

GENERAL PLASTIC PERITONITIS

With Report of a Case

By WILLIAM R. CUBBINS, M. D., and W. J. MARVEL, M. D., Chicago

HENRY Z., aged 37, male, married; occupation saloonkeeper. Referred by Dr. W. J. Marvel. Diagnosis, obstruction of bowel, probably sigmoid. Family history good; no tuberculosis.

Previous illness. Denied in toto all possibility of ever having been ill previously, either with pains in the belly or anywhere else. Claims that he does not drink except very moderately. Venereal history denied, but no Wassermann reaction was made.

Seven weeks ago he began to have a colicky pain in the left side of the abdomen, which radiated toward the right side and was frequently severe around the navel. This pain was accompanied by nausea and vomiting, but no chills, temperature, or tenderness. After a short while (the exact period of time is in doubt) he began to notice the swelling of the abdomen, but did not remember that there was any special change or any special distention of one spot.

Appetite has been fair when he has not been in one of the attacks. Has not noticed any particular food or action that would be likely to bring on an attack. Bowels have been regular and no blood or other abnormality noticed.

Urine normal in frequency and general character. No pain or difficulty at any time. Chemical and microscopical examinations negative.

Physical examination. Thin and rather sallow-looking; skin dry and loose; hair dry and thin; chest normal to our examination; marked abdominal distention. Cardiac area displaced upward, but heart regular in rate and rhythm. Sounds normal.

The distended abdomen presented a V-shaped mass, which extended from the left hypochondrium downward and inward to the pubis and then upward to a point between the umbilicus and the anterior superior spine of the ilium. The walls were so tense that only the fact that there was a vastly distended bowel present could be made out — the angulation, however, being distinct. It was slightly tender, but nothing marked. There was no sign of fluid and there was no œdema of the scrotum or extremities.

At this time he had been vomiting continuously for nearly twenty-four hours and the vomitus had a dark color, with a disagreeable odor, which, however, was not fæcal. No obstruction to the rectum could be made out with examining finger and no gas would pass with enemata.

Without delay the abdomen was opened, the incision being made to the left of the median line, and a large, sausage-shaped tumor was found, which began under the left hypochondrium at the duodeno-jejunal angle and passed outwards, then downwards, forwards and inwards to the pubis and up after an acute angulation at lowest point to a point midway between the anterior superior spine of ilium and navel, where it disappeared into the posterior abdominal wall.

There was no fluid, no small bowels, no colon nor omentum visible. The large blood-vessels on the surface of the spinal column were distinct cephalad to the tumor mass. The upper portion of the abdomen was cut off from this area by a membrane, which extended from the posterior to the anterior wall. This membrane, which was similar to that covering the other parts of the cavity exposed, was clear and of a hyaloid character,

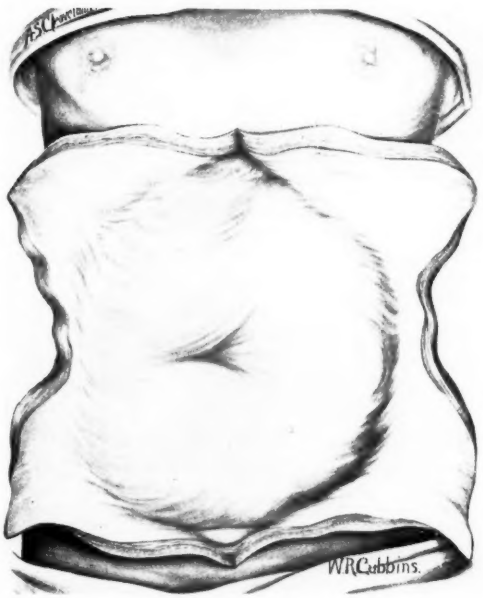

Fig. 1.

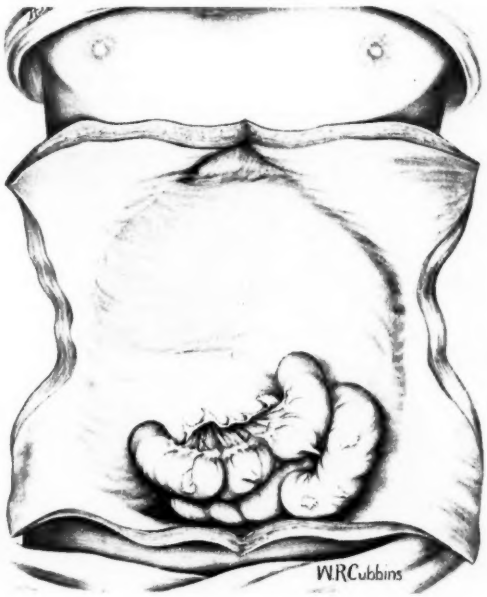

Fig. 2.

and, when opened, proved to be the transverse colon and the omentum, which was firmly adherent to the anterior abdominal wall.

We then began to try and separate this membrane at the lower portion of the tumor mass and found that it would peel off in large flakes and leave the small intestine and one inch of mesentery free and of normal size. To free about six inches of this membrane would loosen up from two to four feet of small bowel, which was laid together in a manner similar to the plaits of a dress (Fig. 2), but, of course, in a rather irregular formation. This membrane was not so firmly adherent to the intestine as it was to the mesentery, except on the distal side, where the bowel had been the most distended. At these points (Fig. 2) of contact there would be bleeding from the bowel surface and there would also be bleeding from the mesenteric surface, if this membrane was detached from it. It is very essential to emphasize the firm attachment of this membrane to the markedly thickened mesentery, in order to prevent some from thinking it might be a retroperitoneal hernia.

I wish to emphasize the fact that fully four-fifths of the uncovered bowel was covered by almost normal peritoneum, being a little granular, except from the points of pressure, where it was ragged and bled. I did not attempt a complete removal of the membrane from the mesentery, as it was not necessary and would only increase an already tedious operation. The liberation of a spot in the lower ileum finally removed the obstruction and the gas, etc., passed into the large bowel.

By this time we had the small bowel freed from the membrane down beyond the ruffling of the mesentery and turned our attention to the colon and sigmoid.

This large bowel was in normal position behind a tense membrane, continuous with the membrane opened above in the transverse mesocolon, which extended from the front of the spinal column to the sides of the abdomen in such a manner as to obliterate the normal depression occurring in this area (Fig. 1). However, the membrane here was much more firmly attached to the peritoneum, and it could not be torn without opening into the retroperitoneal fat or onto

the surface of the colon, cæcum, or sigmoid, which were firmly pressed into the fossa renalis by this membrane.

Another point of value here is to say that here the peritoneum was not puckered or folded, but tense, like the membrane covering it. This in distinction to the membrane covering the small bowel, which might be accounted for by the fact that the small bowel was more active and kept itself somewhat free.

No attempt was made to open farther into the upper part of the abdominal cavity, as we felt that quite enough to obtain at least temporary relief had been done and later, if necessary, more could be freed.

The man made a slow but fairly good recovery and seemed to be going towards permanent health when he was taken with tuberculosis of the lungs and died, about nine months after the operation, and about two months after his pulmonary phthisis was noticed. Much to our disappointment, no post-mortem examination was permitted.

In the hurry of the operation and getting the man to bed, the small specimens of membrane were lost and consequently no microscopic examinations were made, but I felt that the case was worthy of mention, in spite of the fact that it leaves a cloudy etiology and an imperfect diagnosis.

When one begins the study of a case of this type, he is immediately struck with the paucity of literature that bears directly upon the case. Probably the best article is that of Albert G. Nicholls, of Montreal, who has described cases on the same order in an article called "Some Rare Forms of Chronic Peritonitis." He makes a classification after this manner:

Chronic Hypertrophic Peritonitis.

Sporadic.		Diffuse.	
Simple.	Tubercular.	Simple T.B.C.	Carcinoma.

Under this classification he brings such medical novelties as Curschman's Zuckergussleber, and also all the small local areas which are of appreciable thickness, and present the clear hyaloid appearance with which we are familiar as they occur upon the surface of the liver and spleen. However, all of the insidious diffuse cases which he describes have been associated with ascites, which was absent in this case. The cases cited by him from the German are subsequent to injuries and all complicated with ascites.

This brings the discussion into a wider field, that is, Does the ascites of a chronic heart or liver lesion excite the peritonitis that occurs in those cases, or does the peritonitis cause the ascites? This must be left to others, with the fact presented here, that we have a diffuse hyaloid membrane, covering the entire peritoneum, yet with only a normal amount of fluid.

Here it is necessary for us to mention that class of cases which is spoken of as a polyserositis, and which is beautifully described by A. O. J. Kelly. In these we have a multiple involvement of the serous membrane with adhesive pericarditis, pleuritis, and peritonitis, the origin of which change arises in about one-half the cases in the upper abdomen, in about one-half of the remainder in the pleura and pericardium, which leaves one-fourth, the origin of which is unknown. In these cases the peritonitis, as a rule, is most marked in the upper part of the abdomen, where one-half the lesions begin. This also brings into the discussion the so-called pericarditis pseudocirrhosis of Pick, which is nearly always associated with ascites.

As to what part tuberculosis may play in this condition, there is great doubt, but it has been shown that with a bacillus of low virulence the tubercular lesion may be constructive more than destructive, and while the caseous nodules may be absent, there will be a hyaloid membrane relatively avascular that resembles the one I have described. The question as to whether the mild attack of the bovine tubercle bacillus would be the most likely to cause this type of peritonitis will need also to be discussed.

The next point in relation to this case and tuberculosis is whether it would be possible to have a tubercular membrane of the extent this was without its being firmly attached to the bowel at all points.

This hyaloid type of peritonitis may also complicate a carcinoma which has perforated the walls of one of the hollow viscera. This

combination of inflammation and neoplasia Nicholls says would exactly reproduce the picture of a hyperplastic peritonitis. The development of a membrane over any foreign body in the peritoneal cavity has been investigated by a great many and at present we are told that the fibrin is thrown over the mass and appears in parallel fibers; that this fibrin later becomes fibrous tissue and covered with endothelial cells. It is also said that the fibrin deposit nearest related to the endothelial covering is the first to assume a fibrous character. It has been shown by some investigators that when the streptococcus or colon bacillus is present, we have a granular fibrin which does not tend to form permanent adhesions, while, should the fibrin exudate be caused by a pneumococcus or gonococcus, it is striated and organizes into permanent adhesions. This I do not believe will be justified by later investigators. However, it serves to suggest to us that perhaps this man may have suffered an infection with the colon bacillus, causing a diffuse infection and later the organization of this hyaloid membrane.

But to return to the fact that this man died of a pulmonary tuberculosis makes us wonder about the possibility of his having had a tubercular polyserositis of a mild type, which, after the weakening strain of an obstructed bowel and subsequent operation, was enabled to become more virulent and obtain a pulmonary footing, in this way closing the picture.

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THE RELATION BETWEEN SARCOMA AND MYOMA OF THE UTERUS AND ITS BEARING ON X-RAY THERAPY OF UTERINE MYOMATA[1]

BY JAMES RAGLAND MILLER, M. D.

SINCE the advent of the X-ray treatment of myoma of the uterus, the clinical importance of uterus sarcoma has greatly increased. In the early days of the operative treatment of myoma, when enucleation, castration, and other conservative procedures were carried out, the question of the frequency of sarcoma accompanying myoma was much discussed by Fehling, von Ott, and others. At that time, Winter came to the conclusion that operation was not indicated through fear of sarcoma, for the primary operative mortality was much over 6 per cent, and he could claim only 4 per cent occurrence for sarcoma.

The discussion of this subject was quiescent during the time when the total extirpation of the uterus was the operation of choice in treating nearly all myomata. At present, however, the opponents of the X-ray therapy particularly have revived the question, and paint very black pictures of the heavy responsibility that the X-ray therapeutists take upon themselves; the most extreme opponents go so far as to warn against the X-ray therapy, because a sarcoma might thereby be overlooked. These authors, von Herff, Waldhardt, and others, probably reason along the following lines:

Every woman with sarcoma of the uterus who is subjected to the X-ray treatment is lost; every woman, or at least most of these women, if treated by operation, can be saved.

The X-ray therapeutist can, however, bring up the following points for consideration:

[1] From the Universitäts Frauenklinik, Freiburg, Germany; Prof. Krönig, Director

Table I. Occurrence of Sarcoma

Author	Myoma	Sarcoma	Per cent
Bosso	105	6	5.7
Fehling	409	8	1.8
Hofmeier	578	11	1.9
Winter	753	27	3.5
Walthardt	98	4	4.1
v. Gurlt	883	2	.23
Geisler	288	8	2.8
Hauber	138	3	2.2
Barnomo	30	1	3.3
Warnek	120	3	2.5
Pinard	68	3	4.2
Haultain	120	2	1.7
Henkel	146	2	1.3
Snegnireff	83	5	6.
Evelt	139	3	2.1
Nobel (collected)[1]	1994	31	1.5
Torkel	313	10	3.2
Meslay and Hyenne	41	2	5.
Martin	205	6	3.
Essen-Möller	105	0	0.
Kelly and Culle	1400	17	1.2
Schottländer	355	11	3.3
Fleischmann	385	7	1.8
Frankl	216	3	1.4
Bumm	200	4	2.
Hertel	468	13	2.8
Total	9750	192 (average)	1.96
Collected statistics by:			
Lewis	1518	22	1.4
Olshausen	6470	77	1.2

[1] 280 cases of McDonald with 3 sarcomata not included (autopsy cases).

[2] Contains 1000 cases of Pfannenstiel; evidently only sarcomatous degeneration.

First. Is sarcoma so common in connection with myoma as the opponents of the X-ray therapy would have one believe?

Second. Is sarcoma really so difficult to diagnose?

Third. Are sarcoma patients really cured under the operative treatment?

Fourth. Is it not also possible to cure, or at least to check the growth of sarcoma by means of X-rays?

It is not yet possible to give a final answer to this last question, because the cases treated with X-rays are by no means so numerous as those treated by operation, and the period of observation is still too short. Some of the questions can, however, be answered by means of a study of the literature and of the experience up to the present time with the operative treatment. Such a review of the literature has not yet been made. I have undertaken to do it in the following pages, and at the close I shall report the experience of the Freiburg Frauenklinik in relation to this subject.

Table II. Radical Myomectomies

Operator	Number of cases	Deaths
Sarwey (collected)	2450	112
Biermer (Torkel)	180	13
Kleinhaus (Garkisch)	292	16
Giucciardi	367	20
Czempin	36	0
Franz	235	2
Essen-Möller	205	6
Fritsch (Grell)	272	43
v. Franque	158	6
Kiparsky	969	41
Martin	134	10
Scharlieb	100	2
Schottelius	127	5
Pawlik (Pitha)	148	7
Tauffer	364	22
Thorn	175	3
Walthardt	98	1
Jordan	76	2
Karczewsky	48	3
v. Winckel	44	6
Döderlein	67	4
Flatau	100	0
	6646	324=4.87%
Döderlein-Krönig (3rd Edition)	1982	99=5%

The questions which I shall try to answer by means of the study of the literature are as follows:

1. What percentage of myomata are found to be sarcomatous?

2. What is the primary operative mortality of the radical myoma operation?

3. What is the primary operative mortality in sarcoma cases? What is the percentage cured?

4. What per cent of sarcomata can be diagnosed? That is, if they all come to us in consultation, what per cent should we not treat with X-rays?

1. To answer the first question, I have taken from the literature figures which present reports of continuous series of cases among which the search for sarcoma was made. The results can be seen in Table I.

The geographical distribution of sarcoma may be of some importance, but I believe the variability, and particularly the extreme difficulty of the microscopic diagnosis in the individual cases, to be the chief causes for the great differences in figures. Winter claims to have found 4 per cent sarcoma among 700 myoma cases. Pfannenstiel, on the other hand, could not find a single case of sarcomatous degeneration among 1000 cases. According to the figures given in the table, the first question may be answered with *2 per cent.*

2. To answer this question I have collected the figures given in the literature which rep-

TABLE III

Author	Sarcoma	Post-oper.	Recurrence	Total	Per cent	Over one year free from recurrence	Remarks
v. Franque, München. med. Wchnschr., vol. 98, No. 41	16	?	?	?	?	2	
Veit, Handb., ii	42	5	?	5	12	7	3 of the 7 doubtful sarcoma.
Weil, Handb., p. 55	57	..	?	?	?	14?	
Stroganowa, Monatschr., vol. 18, p. 360	12	0	?	?	?	2	
Pignaud, Rev. de Gyn., 1905, p. 850	66	5	20	25	38	..	Vag. Hysterectomy
	25	5	7	12	48	2	Supravag. Amp.
	36	0	13[1]	13	38	24	Mucosa sarcoma
	53	0	25[2]	25	48	27	Interstitial sarcoma
Gessner (Winter), Ztschr. f. Geburtsh. u. Gynäk., vol. 57, p. 29	4	0	3	3	75	1	
Klein, Monatschr., vol. 7, p. 116	36	3	13	16	44	?	
Meineke	8	..	?	?	?	6	
Torkel, Monatschr., vol. 29, p. 346	7	1	?	1	14	?	
Rogione, Diss. Zürich, 76	50	6	32	38	76	3	
Feider, Diss. Bern, 1907	2	0	0	0	0	2	Excision
	2	1	0	1	50	1	Supravag. Amp.
	5	0	3	3	60	2	Vag. Tot. Exst.
	3	1	1	2	66	1	Tot. Ex.
	3	0	3[3]	3	100	0	Exploratory Lap.
Total Feider	15	2	7	9	60	6	
Our cases	5	1	0	1	20	2	

[1] 1 of the 13 2 years later dead from recurrence. [2] 4 of the 25 4 years later dead from recurrence. [3] Discharged uncured.

resent radical operations such as are usually done in myoma cases as shown in Table II.

These figures must, of course, be more closely scrutinized. Olshausen, for example, operated on about 15 per cent of his myoma cases, whereas Noble wanted to operate on every case.[1] It is self-evident that the stricter the indication for operation, the greater will be the mortality, other things being equal. Good statistics may also be obtained by refusing to operate on serious cases.

Considering the figures here given, the primary mortality of the radical myoma operation seems still to be between 4 and 5 per cent.

3. What are the primary and permanent results of this same radical operation when done on cases of sarcoma of the uterus? Table III.

Among the 180 cases which I chose from the literature to answer the fourth question, and which can be seen in full in the current number of *Strahlentherapie*, 23, or 12.7 per cent, were reported free from recurrence of sarcoma after a period of 12 months or more. Of these 180 cases, 81 died, some following the operation and some from recurrence or metastasis; 76 cases were not followed over 12 months. If these 76 cases be excluded, the total mortality from operation and failure to cure would reach the high figure 79 per cent. Of the 180 cases, 74 were sarcomata of the uterine wall, with a mortality of 47.3 per cent; 40 were sarcomata of the mucosa, with a mortality of 42.5 per cent; and 66 cases, in which the kind of sarcoma was not designated, had a mortality of 40.9 per cent.

From a consideration of these facts it seems clear that even with the use of the operative treatment a certain cure of more than 25 per cent at the most cannot be assured.

4. Little if any progress has been made in the diagnosis of sarcoma of the uterus. All authors agree that a diagnosis is almost impossible in the early stages, when the usual signs of malignancy fail. A microscopical examination should be made upon the least suspicion. For the X-ray therapeutist, however, the question of diagnosis can be put concretely as follows: What per cent of the sarcoma cases described in the literature would we get through failure of diagnosis subject to the X-rays instead of the operative treatment, had they all come to us in consultation?

To answer this question I have read over nearly all the reported cases of sarcoma of the

[1] Essen-Möller operated on 52.5 per cent of 200 cases; Winter, on 15.8 per cent of 792 cases; Olshausen, on 16.1 per cent of 927 cases; and Hofmeier, on 60.7 per cent of 578 cases.

uterus, and have selected those cases which satisfied the following conditions[1]:

1. A radical operation, i. e. extirpation of the uterus.

2. A microscopic corroboration of the diagnosis, or a history of subsequent recurrence or metastasis.

Cases under 25 years of age and obvious cases of cervix sarcoma, chorio-epethelioma, and carcinosarcoma have been left out of consideration, because they do not bear on the problem in hand.

I presented the cases thus selected to Prof. Krönig, who answered the question whether or not he would subject each case to the X-ray treatment, using the indications which obtain in the Freiburg clinic as given in the monograph of Gauss and Lembeke. Among the 180 cases selected there were 9 in which an answer was impossible because of poor histories and findings; in some cases the diagnosis had been made previous to operation, and it must be assumed that it would also be possible to make the diagnosis to-day.

The results of the consideration of these 180 cases is as follows:

1. Of 180 cases, 55, or 30.5 per cent, would receive X-rays; 116, or 64.4 per cent, would not receive X-rays; 9, or 5 per cent, unknown.

(*a*) Of these 55 cases which would have received X-ray treatment, 7, or 12.7 per cent, under the operative treatment, were reported more than 12 months later as free from recurrence; 24, or 43.6 per cent, died following operation or from recurrence; 24, or 43.6 per cent, were not followed over one year.

(*b*) Of the 116 cases which would not have received X-ray treatment, 14, or 12 per cent, were reported over 12 months later as cured; 52, or 44.8 per cent, died following operation or recurrence; 50, or 43.2 per cent, unknown.

(*c*) Of the 9 cases where answer was impossible, 2 were alive over one year, 5 died following operation or recurrence, and 2 were not reported.

2. If we consider the different kinds of sarcoma separately, the following figures are obtained: There were 74 out of 180 reported as interstitial in origin, of which 32 would have received X-rays, 39 would not, and 3 were doubtful.

(*a*) Of the 32 which would have received X-ray treatment, 3 were free from recurrence after 12 months, 16 died, and 13 were not reported.

(*b*) Of the 39 which would not have received X-ray treatment, 2 were free from recurrence after 12 months, 18 died, and 19 were not reported.

(*c*) Of the 3 doubtful cases, 1 lived over a year, 1 died, and 1 was not reported.

3. Only 3 out of 40 sarcomata of the uterine mucosa would have received X-ray treatment; 36 would not, and 1 case was doubtful.

(*a*) Of the 3 cases which would have received X-ray treatment, 1 lived over a year, 1 died, and 1 was not reported.

(*b*) Of the 36 cases which would not have received X-ray treatment, 1 lived over a year, 16 died, and 14 were not reported.

4. Of the 66 cases in which the origin of the sarcoma was not designated, 21 would have been rayed, 40 would not, and 5 were doubtful.

(*a*) Of the 21 cases which would have received X-ray treatment, 4 were free from recurrence over one year, 7 died, and 10 were not reported.

(*b*) Of the 40 cases which would not have received X-ray treatment, 5 were reported well after one year, 16 died, and 19 were not reported.

(*c*) Of the 5 doubtful cases, 1 was alive after one year, and 4 died.

If we consider the above given figures it must be admitted that, of the 55 cases which we should have treated with X-rays, 7 would perhaps have died under that treatment, whereas they were really reported after one year as cured. We can, however, be satisfied to have so few as 7 when we think of the high mortality and poor end results of the operative treatment.

Out of 74 interstitial sarcomata, 32 would have received X-ray treatment, i. e., if one may be allowed to say so, a mistake in diagnosis in 43.2 per cent of the cases. We do not go so far as to say that all the other cases could have been diagnosed, but many cases

[1] These cases may be seen in Table IV of my article in Strahlentherapie, Bd. ii, H. 1, 1913.

are excluded from the X-ray therapy on the ground of the contraindications to it and because of other conditions which in themselves would lead to operation.

The best diagnostic results are in the mucosa sarcoma group, where we should have made mistaken diagnosis in only 7.5 per cent of the cases.

We may reckon in general 2 sarcomata among 100 myoma cases; let us now consider a mistake in diagnosis of 43.2 per cent, and we should have, among about 125 myoma cases, 1 which through failure in diagnosis would be subjected to X-ray treatment. In this sense, then, one can reckon the mortality of the X-ray treatment as 0.8 per cent, which compares very favorably with the high primary operative mortality of myomectomy. This corresponds exactly to the experience in the Freiburg clinic, for of the 5 sarcoma cases we should have treated only 3 with X-rays, and one died anyhow following operation, which makes 2 out of 318 myoma cases, or 0.63 per cent, as our theoretical X-ray mortality.

In the following pages I shall review briefly this experience. Since October 10, 1906, all myomata removed by operation in the Freiburg Frauenklinik have been carefully examined in the pathological institute under the control of Prof. Aschoff. Up to February 7, 1911, among 249 myoma cases not a single sarcoma was found. Between February 7, 1911, and July 28, 1912, there appeared suddenly 5 sarcomata among 69 cases. It would be wrong to draw any conclusions from either series of cases. As Schottländer says, "The principal reason for the high figure (5.7 per cent — Basso) may perhaps be the relatively small number of cases and the appearance of relatively many malignant changes within a short period of time.[1]

In the space of time between January 1, 1909, and February 7, 1911, 47 myoma cases were treated entirely by X-rays, between February 7, 1911, and July 28, 1912, 138 myoma cases were rayed. No one of these has up to the present time shown signs of malignancy.

[1] Zentralbl. f. Gynäk., 1912, p. 657.

Among the 318 operated myomata were 5 sarcomata, i. e. 1.6 per cent. If we reckon the X-ray cases with these, we should get 501 myomata with 5 sarcomata, or 1 per cent. Furthermore, had we as a matter of principle treated every case with X-rays, we should still have rayed only 3 out of the 5 sarcomata. Case 2 was pregnant, and Case 5 was previously diagnosed. Again, Case 1 died after operation; she could not have done worse had she been treated with X-rays, the probabilities being in favor of prolongation of life for several months.

The individual histories are given below.

CASE 1. A 50-year-old peasant woman, who had suffered for 10 years with heart trouble following influenza. The first menstruation appeared at the age of 14 years; the last menstruation was 4 days previous. Patient has had no children. The menstruation has become stronger during the past year; aside from that, the patient complains of shortness of breath, cough, expectoration, and constipation. For the last 3 months, pains in the right side when lying on the left side. For one month, ischuria.

Examination. Hbg. 45 to 50 per cent; urine shows traces of albumin. Patient is poorly nourished and short of breath. The uterus cannot be well felt; the cervix is drawn high up, the vagina funnel-shaped, and the uterus could not be sounded. A hard tumor fills the pelvis and reaches the umbilicus. *Diagnosis.* Myomata uteri, ischuria paradoxa, myodegeneratio cordis. *Operation.* June 26, 1911, morcellement and supravaginal amputation of the uterus. Exitus after 20 hours. *Pathological report.* Spindle-cell sarcoma, interstitial type. Lung metastases.

CASE 2. A 36-year-old factory worker, who has always been well. Menstruation was without unusual features. The last period was 5 to 6 months ago. During the last 4 months the patient has complained of abdominal pain. The abdomen has rapidly grown.

Examination. Uterus anteflected, drawn to the left, and about the size of a fist. It is pressed to the left by a tumor twice as large, which feels hard. The vagina is relaxed as in pregnancy, but is not bluish in color. The cervix is open. Uterus on sounding measures 14 cm. The breasts contain colostrum. *Diagnosis.* Pregnancy in the fifth to sixth month; myoma (tumor of the ovary?). *Operation.* May 18, 1911, total extirpation, with the left adnexa. Discharged on the 17th day. *Control examination,* June 5, 1912; no recurrence. *Pathological report.* Puerperal uterus. Myoma which shows many cells, some of atypical structure and nuclear form, with relatively many mitotic figures, so that the diagnosis of myosarcoma must be made.

CASE 3. A 40-year-old woman, a conductor's wife, who has had 5 children. Periods at first weak; have become stronger during the past year. Patient

complains of headache, backache, abdominal pains, dizziness, and shortness of breath.

Examination. Pale, moderately well-nourished woman. Systolic murmur at the apex, increase of the second pulmonary sound. Uterus hard, enlarged, movable. On one side of the uterus is a tumor. *Operation.* September 9, 1911, total extirpation. Highest temperature was 39.2° on the sixth day, when a slight thrombosis developed. Since the report came that the tumor was malignant, an inguinal gland which was swollen was removed on the 17th day. It was reported negative. Discharged on the 26th day, cured. *Control.* April 5, 1912, inguinal glands slightly swollen; no signs of recurrence. *Pathological report.* Myoma with myosarcomatous parts.

CASE 4. A 47-year-old woman, a day laborer's wife, who has had 3 children and one abortion. The last birth was 20 years previous. Menses have been regular, weak, and somewhat painful. Patient seeks medical advice because of pains in the abdomen and back, which occur before and after menstruation.

Examination. Pale, well-nourished woman; weak presystolic murmur at the apex. Vagina narrow, cervix closed, uterus the size of a fist, retroverted, hard, and fixed. The adnexa are not to be felt. *Diagnosis.* Myoma uteri. *Operation.* February 7, 1911, Ext. tot., cum adnexis sinistris. Highest temperature, 37.9° on the sixth day. Discharged as cured on the 16th day. *Control.* June 23, 1912, no recurrence. *Pathological report.* Suspicious tumor which shows rather numerous short spindle-cells, which can be called (suspected) sarcomatous. No destructive growth is to be seen.

CASE 5. A 56-year-old peasant, who was never sick; II-para: Two years ago, when the patient was operated on in this clinic, the following notes were made:

Patient complains of a fullness and pressure in the abdomen, with shooting pains and increase in size. *Diagnosis.* Cystoma ovarii (carcinomatosis peritonei?). *Operation.* November 4, 1910, cystomectomia dextra, Salpingoöphorectomia sinistra, appendectomia. Difficult on account of adhesions. Following the operation, menstruation ceased. During the last 15 months there has been a vaginal discharge, which grew more copious and ill-smelling. Patient has lost weight. *Examination.* Stinking vaginal discharge. The cervix admits one finger and contains disintegrating, easily bleeding tumor masses. To the right of the uterus, a small tumor the size of a plum. Parametria not involved. *Diagnosis.* Submucous myoma or corpus carcinoma. Pieces of the tumor removed gave the following microscopical findings: the pieces of tissue are largely hæmorrhagic and necrotic, and in single instances around the blood-vessels is a zone of large, plump spindle-cells. It is a case of spindle-cell sarcoma, perhaps myosarcoma. *Operation.* December 20, 1911. Wertheim extirpation, with preliminary camphor-oil treatment. The wound later became necrotic and healed slowly. Discharge on the 29th day. *Control.* June 5, 1912, no recurrence. *Pathological report.* The diagnosis of sarcoma is confirmed.

Let us now consider the cases reported by Warnekros.[1] Is he justified in saying that his seven sarcoma cases would have surely died if X-rays were the routine treatment? Prof. Aschoff was kind enough to help me answer this question by criticising the microscopical illustrations accompanying the article of Warnekros. His answer, based on the illustrations, was that only Cases 2 and 7 can be considered as undoubted sarcoma; Cases 1, 4, and 6 are doubtful, and in Cases 3 and 5 he could not agree with the diagnosis of sarcoma. In Case 7 it is to be regretted only an enucleation was done. Case 6 was 54 years old, and we should have used X-ray treatment cautiously; and if it had not reacted within a very short time, we should also have operated.

Even if all these cases had been treated by X-rays, it does not follow that they would all certainly die because of false treatment; we know, indeed, that X-rays have a destructive action on carcinomatous and sarcomatous growths in other parts of the body, so that such an action might even be expected in these cases under the intensive X-ray treatment as it is carried out to-day. This checking action of the X-rays may indeed give us the right to use the X-ray treatment conditionally in uncertain cases, and later undertake operation, without making any great difference in the chances of cure.

The four cases of Bumm, which Warnekros also reports in his paper, agree with the answer I made to question No. 3. Four out of 200 myoma cases died later of sarcoma recurrence, in spite of the radical operation. We should furthermore have treated only 2 of the 4 cases with X-rays. Case 2 was 63 years old and had a typical history of corpus carcinoma, and Case 3 we should probably also have operated on because of her intestinal symptoms.

The fears of Warnekros seem, therefore, to be well grounded, and indeed it appears all the more so since even those who formerly were its bitterest opponents have lately

become enthusiastic users of the X-rays in treatment of myoma of the uterus.

The fear of the knife does not exist, as Flatau says,[1] "in indirect proportion to the trustworthiness of the physician in question." For the public, the timidity in facing operation plays a great rôle, and one will always have to reckon with it. Sarwey, indeed, gives us definite figures concerning it. He reports that of 460 patients who should have been operated on, no less than 30 could not take the treatment, and 10 indeed absolutely refused. He found out later that no less than 6 of these died, probably because of lack of treatment. He does not reckon these cases, however, in his mortality list. It is therefore self-evident that the figures given as primary mortality of the myoma operation do not tell the whole story.

RÉSUMÉ

To sum up briefly, I may draw the following conclusions:

1. Sarcoma may be said to occur in about 2 per cent of all myomatous uteri.

2. The primary mortality of the operative myoma therapy is still about 4 to 5 per cent.

3. A lasting cure of sarcoma of the uterus by the operative treatment can only be expected in 25 per cent of the cases at most.

4. Considering the advantages of the X-ray over the operative treatment in regard to assured freedom from fatality, mistakes in the diagnosis of sarcoma amounting to 0.8 per cent make little difference.

5. When the public learns that not every tumor of the uterus demands operation, but that there are also efficient conservative methods, we shall certainly be in a position to get hold of more malignant growths in the curable stage.

In view of the above facts I believe there can be no further doubt that a routine operative treatment of myoma of the uterus, for fear of sarcomatous degeneration, need not be carried out. This ghost should be buried at once.

It is my pleasure to thank Prof. Krönig for the suggestion of the theme and for the free use of his material, and Dr. Schlimpert for his kind assistance in the preparation of the paper.

[1] Ztschr. f. Geburtsh. u. Gynäk., 1912, Bd. lxx, H. 3.

DEPARTMENT OF TECHNIQUE

A REPORT ON TWO CASES OF CERVICAL RIB AND AN OPERATIVE MEASURE TO PREVENT RECURRENCE OF SYMPTOMS

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A REVIEW of the literature on neuritis of the upper extremities convinces one of the fact that until recently many cases of supernumerary or cervical rib passed unrecognized.

Embryologically, the anterior portion of the transverse process of the cervical vertebra is the "anlage" of a rib. Why this structure in the seventh cervical vertebra should continue to develop in certain cases and not in others cannot be definitely determined.

For a number of centuries anatomists have recognized extra cervical ribs, but this anomalous condition was not associated with the clinical phase which we now know these ribs produce.

The X-ray, properly interpreted, has done much to bring out the underlying cause of so-called brachial neuritis. Not infrequently surgeons meet cases where inexperience in the use of the X-ray has led physicians to make an incorrect diagnosis of bone lesions. I mention this from the fact that, in the first case reported in this paper, two medical men failed to recognize a cervical rib with the use of the X-ray, even after the case had been reported to them as one of supernumerary rib.

I believe the complete and permanent success of the operation for the removal of a cervical rib depends principally upon two points in technique: (1) An incision that gives easy access to the rib, so that it may be removed entirely with a minimum amount of trauma to the brachial plexus and subclavian vessels; (2) The proper protection of the plexus and vessels from the upper surface of the first dorsal rib, which has been denuded of its periosteum by the removal of the osseous attachment of the distal end of the offending cervical rib.

In the author's plan of operation, an incision is made from a point midway between the origin and insertion of the sterno-cleido-mastoid muscle and along its posterior border in a straight line to the lower border of the clavicle. A second incision is made parallel to the first, and two inches posteriorly from the anterior edge of the trapezius muscle, to a corresponding point on the clavicle. These two incisions are now connected by a third incision, carried over the clavicle as shown in Fig. 1.

Figure 2 shows the author's method of employing a portion of the scalenius medius muscle to cover the upper surface of the denuded first rib, thereby forming a cushion for the brachial plexus and subclavian vessels.

Figure 3 illustrates the position of the nerves and vessels lying on their new bed of muscle tissue taken from the scalenius medius muscle.

Closure of the wound in the ordinary way. The arm is wrapped in an abundance of cotton and placed on a posterior splint.

HISTORY OF CASES

Case 1, referred by Dr. S. J. McNeill. Mrs. J., age 37; housewife; June 23, 1911. *Family history*: Father dead of locomotor ataxia; mother's death sudden, cause unknown; one brother living and in good health; one sister living and in good health; one dead, by accident. *Personal history*. Usual diseases of childhood. Patient claims that since childhood she has had poor circulation in her hands, particularly the right hand. For the last two years there has been severe pain in the right hand. Since the last nine months there has been a constant aching pain in the right hand. She has noticed difficulty in closing the hand, also difficulty in using the member to put up her hair. In December, 1910, patient accidentally burned the right middle finger, which caused a deep ulcer.

Examination of the right hand and arm showed marked muscular atrophy and weakness; disturbed sensation throughout the arm. There were ulcers on the thumb and all the fingers. The ulcer on the middle finger deserves especial attention since it represents the communication with a pathological compound fracture of the second phalangeal bone of that finger, brought about by a disturbed circulation and inervation. *Examination* of the right side of the neck. A well-marked bony tumor could be made out on the right side of the neck, above the clavicle, between the posterior border of the sterno-mastoid muscle and anterior border of the trapezius muscle. X-ray pictures showed this tumor to be a bony excrescence of a cervical rib at the point where the brachial plexus and subclavian vessels cross that structure.

Case 2, referred by Dr. A. H. Bauer. Mrs. M. M., age 23. *Family history* negative. *Personal history*.

Fig. 1.

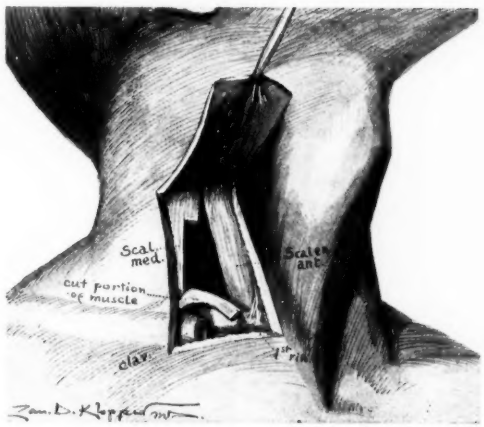

Fig. 2.

Housewife; two children, no miscarriages; never sick before. Menses normal and regular; urination normal; bowels regular. Present condition: Gradual onset, with increasing weakness and coldness of right arm and hand; began about two years ago. Grasp of hand weak; right forearm thinner than left; patient is right-handed. *Examination.* Medium size woman; bones are light; fair development. Head negative; chest negative; abdomen negative. Right arm shows muscles flabby and atrophied; the arm is thinner than the left, especially below the elbow. Muscles of thenar eminence especially wasted. Fingers of right hand appear long and thin. Grasp of this hand weak. Arm and hand cold. Has difficulty in picking up pins. X-ray pictures show a well-developed cervical rib on the right side and an undeveloped corresponding rib on the left side, represented by a short costal projection attached to the transverse process of the seventh cervical vertebra.

Case I is particularly interesting from the point of view of age. In the relatively large number of cases reported in the literature of this subject, the majority of the patients began to show symptoms long before the twenty-fifth year. The late age at which this patient began to complain of her distress may partially be accounted for from the fact that for the past five years she was of the Christian Science persuasion. Her "belief" may explain the endurance of pain during the period, beginning with an ulceration of the right middle finger and ending with a complete compound pathological fracture of the second phalangeal bone of that digit, at which time she presented herself for surgical intervention, and which represented a period of nearly two years.

Referring to the post-operative history of this case, I wish to place special stress upon the length of time paralysis remained in the entire right ram — a few days short of two months. This temporary nerve disturbance obtained despite the fact that the most detailed precautions prevailed in protecting the brachial plexus from the slightest stretching or injury during the operation. After two months, however, the paralysis disappeared and recovery was very rapid, so that at this time — over a year after the operation — the patient has a perfectly normal condition in her arm and hand.

The broken finger bone above referred to was amputated a month after the original operation, when the circulation had improved following the removal of the offending rib.

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Fig. 3.

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LATERAL INTESTINAL ANASTOMOSIS; A MODIFICATION OF THE FERGUSON–GRANT METHOD

By RAYMOND C. TURCK, M. D., Jacksonville, Florida

A NUMBER of methods for the lateral union of intestine have as a prime consideration the completion of as much of the suturing as possible before making the anastomotic incision, the object being to avoid soiling the field of operation with bowel contents, which is the inevitable accompaniment of all operations in which the bowel is widely opened before the sutures are inserted.

These procedures may be divided into two classes: those in which suture alone is employed, and those in which some mechanical aid is utilized. In none of these operations has it been possible to absolutely prevent leakage of material from the bowel, and many of the methods offer further disadvantage, in that there is a tendency to overmanipulation of the gut and to faulty suturing.

Of such procedures by suture without mechanical aid, the Halsted method of placing and tying the lower row of stitches and inserting the upper row of sutures before making the incisions in the bowel most nearly fulfils the first indication, yet it is necessarily a slow operation because interrupted sutures are employed; there is a possibility of leakage between sutures, and even if the writer's leak-proof interlocking suture is used there is still danger from hæmorrhage from the cut mucosa; there is inevitably much handling of gut, with the possibility of subsequent shock; there is undoubtedly a lesser degree of safety in any intestinal reparative operation in which dependence is placed upon but one layer of sutures — disadvantages which should condemn this procedure and all others of its type.

The merits of the numerous permanent, subpermanent, and temporary mechanical aids have been widely discussed and tested, and I believe a majority of surgeons are of the opinion that anastomotic operations which, when completed, leave behind no foreign body other than suture material, are eminently the most satisfactory, certainly the most surgical.

The ideal intestinal anastomosis should combine the following essential features:

A. Accurate approximation of peritoneum entirely around the anastomosis. This, the basic principle of Lembert, must be considered the foundation of all gastro-intestinal repair.

B. The cut edges of the mucosa must be secured, to prevent hæmorrhage, and to this might be added, to prevent absorption of infectious material through unsutured raw areas.

C. The method of suturing should be simple and easily understood and should provide for rapid insertion.

D. The completed anastomosis should be proof against leakage, and should be made with two rows of sutures — the first to secure mucosa and roughly approximate peritoneum, the second row to accurately approximate peritoneum and act as a second line of defense in case of an infection or slough in the area of the first stitch line.

E. There should be but a minimum of bowel handling as a provision against secondary shock.

F. There should be but little, if any, contamination of peritoneum about the operative area.

Lateral anastomosis with the Roosevelt or Moynihan clamp, if made with two rows of continuous sutures, is a very satisfactory procedure, the disadvantages being the possibility of injuring the bowel wall by pressure of the clamp beyond the anastomosis and the usual danger of peritoneal infection from escape of small amounts of bacteria laden secretion. The Murphy button, the Dawborn potato plate, and other devices of their type are open to the principal objection, that is, possible peritoneal contamination.

Ferguson of Chicago presented before the Chicago Gynecological Society of 1900 a modification of Grant's enterotome clamp for the facilitation of lateral anastomosis and gastro-enterostomy. The instrument consisted of a forceps with grooved blades and a spadelike enterotome made to slip in the groove when the blades were closed. With this instrument it was possible to complete all the suturing before any opening in the bowel was made other than the small punctures through which the blades entered. In practice, however, it was found that while the use of the forceps aided materially in the placing of the sutures and provided a minimum of bowel handling, it was very difficult to cut through the septum with the sliding knife, and for this reason the instrument obtained no general use. At about this time the writer devised an emergency lateral anastomosis, using a phimosis forceps in place of the Ferguson-Grant enterotome, cutting the septum with a round-pointed curved bistoury after the completion of the suturing.

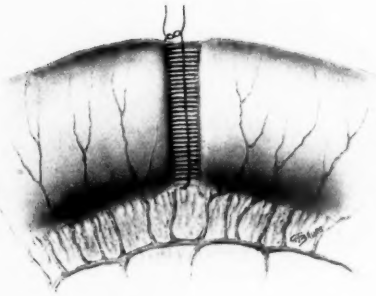

Fig. 1. Showing bowel crushed by forceps and ligature placed ready to tie.

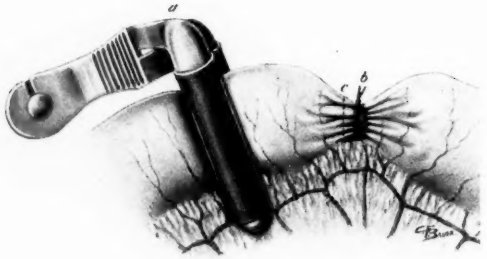

Fig. 2. Showing ligature tied at *b*; Murphy clamp at *a* to prevent escape of bowel contents; dotted line at *c* where bowel is to be divided by cautery.

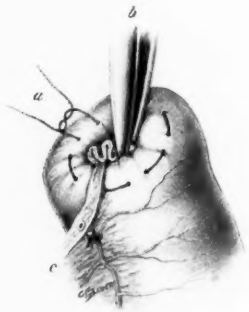

Fig. 3. Redrawn from Kelly-Noble, Vol. II. *A*, purse-string suture to bury ligated stump; *B*, tissue forceps invaginating stump; *C*, cut edge of mesentery with vessels ligated.

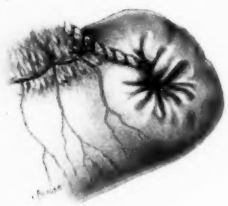

Fig. 4. Purse-string suture tied and stump buried. Cut edge of mesentery secured by whip-stitch.

The forceps here presented is simply an ordinary phimosis forceps lengthened, curved on the edge and made heavier so as to act as a crushing instrument. Gastro-enterostomy has been done with this instrument, but it seems to work out particularly well in all anastomoses of small intestine or in union of small and large bowel.

When bowel ends are completely severed, the method of closure of the ends is worthy of some consideration. The bowel should first be clamped by heavy angiotribe forceps and a ligature placed at the point of crushing, as shown in Fig. 1. The ligature should be passed through the mesentery with some blunt instrument such as a mosquito forceps, blunt ligature carrier, or with a needle passed eye-end first. No sharp needle should ever be passed through mesentery, because of the danger of puncturing mesenteric vessels. The ligature having been tied, the distal end of the bowel should be gently stripped with the fingers to force back all the fæcal content possible, and a Murphy clamp placed as

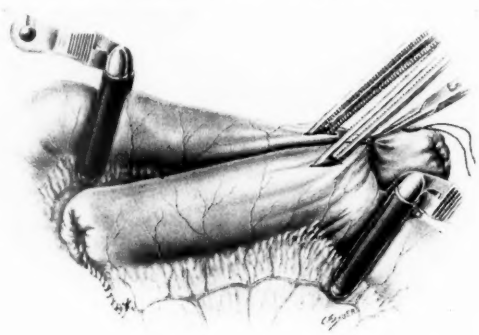

Fig. 5. Bowel approximated so that peristalsis is not reversed. Traction suture to facilitate insertion of forceps blades through small punctures. Murphy clamps to further prevent escape of bowel contents.

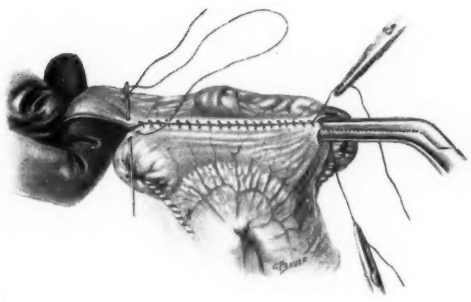

Fig. 6. Forceps inserted, closed and first row of continuous suture passing through all coats begun.

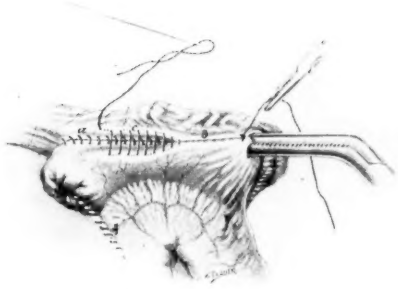

Fig. 7. First row completed around both sides; second row continuous right-angled Cushing's suture begun.

shown in Fig. 2. The best practice then is to divide the bowel with the actual cautery at the line shown at C in Fig. 2.

The mesentery having been divided and any spurting vessels ligated with fine catgut, a Lembert purse-string suture is placed as shown in Fig. 3 and the stump inverted and buried by tying the purse-string as shown in Fig. 4. The cut edge of the mesentery should then be sewed over with a continuous whipstitch, as shown in Fig. 4.

Both bowel ends having been thus treated, the bowels are laid side by side, always making certain that peristalsis is not reversed. A single stitch of the Lembert type is inserted to act as a traction suture, small punctures are made in each loop of bowel, and the forceps blades are pushed through into the interior of the gut, as shown in Fig. 5. The punctures should be as small as possible, so that the bowel wall will fit snugly about the forceps blades to minimize the escape of bowel content during the operative work. The forceps is then closed tightly, so as to crush the intervening bowel wall. This will later cause a slough and still further increase the anastomotic opening. The only possibility of leakage of bowel content being along the sides of the forceps through

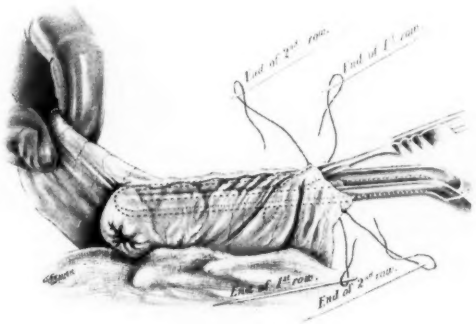

Fig. 8. First and second row of sutures completed with ends left long; curved bistoury dividing septum through the fenestrated forceps blade.

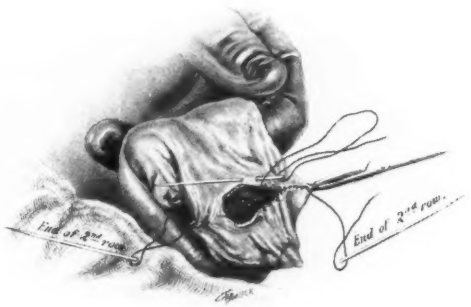

Fig. 9. Forceps withdrawn and opening being closed. First suture line with the author's modification of the Connell suture.

Fig. 10. First row completed. Second row continued and tied to the first end, which has been left long.

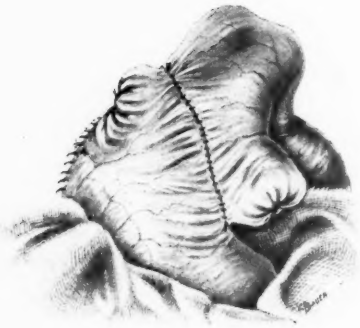

Fig. 11. Completed anastomosis.

the small punctures, as a further assurance against peritoneal contamination the forceps at point of entrance may be wrapped with a sponge moistened with a normal salt solution.

Beginning near the point of entrance of forceps, the first row of sutures is placed as shown in Fig. 6. This suture should penetrate all coats of the bowel, and this can be determined by passing the needle each time until it is felt to be in contact with the blade of the forceps. The suturing is continued around the end of the forceps and back on the other side until it arrives at the point of puncture. This first row suture should be of linen or of chromic catgut. The ends should be left long, that they may be utilized in closing the opening which remains after the forceps are withdrawn.

The second row of sutures is then placed, beginning as before at the point of entrance of forceps and continuing around the end and up the other side to the point of puncture. This suture should be of silk and should be a continuous Lembert, or, preferably, a continuous right-angled Cushing-Lembert stitch, as shown in Fig. 7. A back or lock-stitch at every fifth or sixth suture will prevent puckering and give additional strength.

Both rows of sutures having been completed on both sides of the forceps blades, a round-pointed curved bistoury is then entered into the fenestrated forceps and the septum cut through, as shown in Fig. 8.

The septum having been cut through, the forceps is removed, and there remains to be closed but the small opening through which the forceps entered. The first row of stitching is best continued by the Connell suture, which penetrates all coats of the gut and inverts the cut edges, as shown in Fig. 9. It will be noted that the Connell suture may be put in exactly as the right-angled Cushing suture is placed, except that in the Connell the needle penetrates all coats of the bowel, taking a bite from peritoneum to mucosa, thence from mucosa to peritoneum, while the Cushing pierces only the peritoneal, muscular, and fibrous coats. The continuous Connell suture placed in this manner is very much easier of insertion than if the needle is completely drawn through each time it enters or emerges from the bowel, as described in Connell's original work. The principle and the final result are exactly the same.

It will be noted that in this operation there is but a minimum opportunity for peritoneal contamination through escape of bowel contents, more than 90 per cent of the suturing being completed before opening the bowel; the anastomosis is made with two rows of sutures, the first penetrating all coats of the bowel so as to prevent hæmorrhage from the mucosa and secure rough approximation of peritoneum, the second row as an additional insurance against leakage and to insure accurate approximation of peritoneum; the anastomotic opening is made any length, from one to five inches, and is generous in width owing to the fact that there will be a slough of that portion of the bowel wall included between the forceps; there is but a minimum of handling of gut, because the bowel is held wherever desired and manipulated by the forceps instead of by traction sutures or the assistant's fingers.

A decided advantage in this type of forceps is that it does not matter how firmly the forceps is clamped, since a slough is desirable to increase the anastomotic opening; while in using the Roosevelt or Moynihan clamp, much care must be exercised that there may be no injury to the bowel outside of the operative area.

The writer desires to acknowledge the valuable assistance of Dr. J. Knot Simpson in the perfecting of the technique and in the preparation of the rough sketches which were so accurately redrawn by Mr. Chas. F. Bauer of Philadelphia.

Fig. 12. The author's fenestrated lateral anastomosis forceps.

A NEW OBSTETRICAL RUBBER DILATING BAG

By FREDERICK LEO GOOD, M. D., Boston

NO longer can there be any doubt as to the efficacy of the rubber bag in dilating the parturient cervix. Neither can there be any question as to its indispensability if we are to do good obstetrics. After using the obstetrical bag for the past five years, I am firmly convinced that it occupies a position second in importance only to the forceps. A rubber bag filled with water exerts an equal pressure in every direction; consequently it is the nearest possible approach to the amniotic bag of waters.

I feel that the ideal bag is one that will exert an equal pressure everywhere (a pressure on both the entire cervix and the lower uterine segment), that will not displace the head, and that is easy of introduction. Some bags in use to-day exert pressure on the cervix, but not on the lower uterine segment. Other wedge-shaped bags exert pressure on the lower uterine segment and on that part of the cervix in contact with the bag, but if the cervix is not "taken up" there are parts of it where there is no pressure, or at the best an uneven pressure.

I believe that this bag, photographs of which are here shown, overcomes the objections that I have mentioned, and withal it is easy of introduction.

Fig. 1 shows the bag before it is filled with water. It is mushroom-shaped and has two separate compartments. Compartment A is for cervical pressure and compartment B for pressure on the lower uterine segment. Tube C is for filling compartment A, and tube D, which runs directly through compartment A, is for filling compartment B. The compartments are so joined that they give the appearance of but one bag. When ready to be introduced, the bag is easily folded on itself and either an hysterectomy or gastro-enterostomy clamp closed upon it. If the case happens to be one not yet in labor or one with not enough dilatation, the cervix is dilated with a simple steel dilator sufficiently to allow the passage of the bag and clamp. I have found that if there is enough dilatation to easily admit the finger the bag can be introduced without any difficulty. After the bag is introduced, compartment B is filled with sterile water and traction made on tubes C and D. (Filling compartment B and then using traction accomplishes two things: (*a*) it prevents the bag from slipping out, and (*b*) it assures us that when compartment A is filled it (A) will be in close proximity to the cervix at every point.) Compartment A is now filled with water. There is then an equal pressure everywhere on the cervix from compartment A, and pressure from the wedge-shaped compartment B on the lower uterine segment. Compartment B will not do its greatest good until the cervix is well "taken up," and can either be left filled with water or emptied, to be filled again without removing the bag after compartment A has caused the cervix to be sufficiently obliterated. My object in first filling compartment B is to make certain of having compartment A properly placed against the cervix. After compartment A has caused all the dilatation that it is capable of doing, it should not be emptied, as one of its functions is to strengthen the base of compartment B.

Fig. 2 shows the bag with both compartments filled with water. The wedge-shaped border of compartment B is plainly visible in the photograph ("E"). When compartment B is filled its top ("F") is concave, and at no place measures more than three quarters of an inch from its base to its upper surface. In other words, compartment B is nowhere more than three quarters of an inch within the uterine cavity (yet always

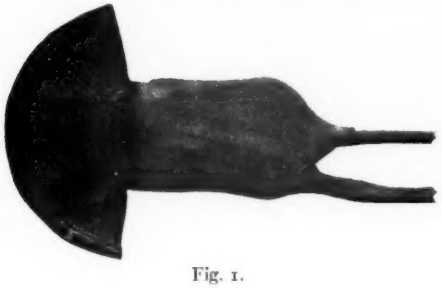

Fig. 1.

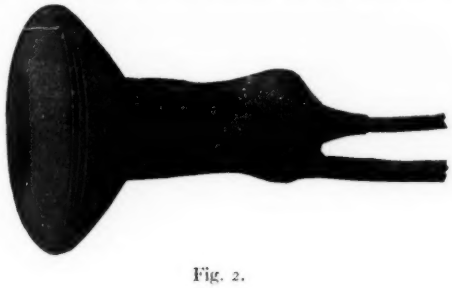

Fig. 2.

exerting great pressure), and cannot displace the head enough to make it of any consequence.

Compartment A is three inches long and 1½ inches in diameter. Compartment B is 3½ inches in diameter, and ¾ inch from its base to its top. Its base being 1½ inches in diameter, its top 3½ inches in diameter, and its thickness but ¾ inch, its wedge-shaped properties can be easily appreciated. Tube C and D are 15 inches long, allowing them to be folded on themselves and tied to prevent the escape of water.

The bag having been inserted, occasional traction is made in order to force the uterine contractions. I feel that cervical dilatation of 3½ inches (the diameter of top of compartment B,) is sufficient, for when such dilatation is obtained the patient is in hard labor, and contractions would follow in quick succession after the bag, having accomplished its purpose, was either precipitately expelled or ultimately removed by traction. The conduct of the rest of the delivery depends on circumstances, and can be either normal or by forceps.

Another advantage of the above described dilator is that a single bag can suffice for all work, and it is not necessary to use a series of bags, starting with a small size and ending with a large one; though the bag can be made of different sizes if desired.

I shall not discuss the type of cases in which bags can and should be used. Strict asepsis is of the utmost importance. The syringe for filling the bag may be of either glass, metal, or rubber and should be thoroughly sterilized before using. The bag should be filled with sterile water. It is well to find out before introducing the bag how much water is needed to thoroughly fill each compartment. Then, after introduction, fill a syringe with that amount of water and inject it into the bag.

RUPTURE OF THE UTERUS[1]

By BARTON COOKE HIRST, M. D., Philadelphia

IT would be interesting to treat this subject in its entirety were it not so complex, and had we time and patience for its full discussion.

From Bandl's discovery, in 1875, of the mechanism of the most frequent kind of uterine rupture in his time, we might trace with profit the steady development of our knowledge of the subject: Freund's explanation of conditions that determined rupture of the vaginal vault instead of rupture of the uterus; the fuller comprehension of the part played by the stretching of the round ligaments in the elevation of the upper uterine segment and the attenuation of the walls of the lower uterine segment; the recognition of a rigid cervix and degeneration of the uterine muscle as etiological factors; the interesting light thrown upon a rare variety of the accident in the collection of twenty-seven cases of repeated spontaneous ruptures of the uterus by Becker, with the addition of an original observation, the series comprising a period of one hundred and forty-two years[2]; and the information obtained by the clinical studies of spontaneous rupture of the uterus in pregnancy at the fundus — studies, it must be confessed, not enlightening us much as to the etiology of this peculiar occurrence, although teaching us valuable lessons in diagnosis and treatment.

But I must forego too wide an excursion into the history and detailed description of an obstetric complication that has the greatest interest to us specialists, and must be, I trust, of some interest to the general physician, who may at any moment encounter this appalling accident in his practice. The scope of this communication is confined mainly to three points in connection with ruptured uterus.

First, that the accident is more frequent now than formerly, although with the progress of medicine it ought to be less frequent, for it is often preventable; it is an evidence, usually, of errors in diagnosis or faults of technique, and is rightly regarded as a reproach to the physician in whose hands it occurs.

Second, the diagnosis is not as easy as the general physician might suppose, in view of the distinctive symptoms and the gross nature of some of them. This is particularly true of spontaneous rupture of the fundus.

Third, the treatment is not to be dismissed by the rule of thumb — to open the abdomen in every case and to amputate the uterus.

The first statement is one, I think, to which the

[2] From Lambron's case, 1770, to Becker's, 1912.

[1] Read before the Springfield Medical Society, December 10, 1912.

attention of the profession should be particularly called. Ruptured uterus, as previous generations saw it, is not so frequent now; that is, the neglected or unrecognized cases of obstructed labor, with laceration of the lower uterine segment by distention of its cavity and ascension of the upper uterine segment by elongation of the round ligaments. What augments the number of cases now, if I may judge from what I see in consulting practice, is the hasty application of inappropriate means to extract the uterine contents or a clumsy effort to employ the right methods. For instance, in the writer's recent hospital and consulting practice, in a period of nine months there were six cases of ruptured uterus, every one of them from instrumental or manual interference.

In one case, an effort to evacuate the womb with a curette forceps at the third month, for what was thought to be eclampsis but was probably hysteria, resulted in a perforation of the uterine wall, the extraction, and the detachment of the whole twenty feet of the woman's small intestines!

In another case, the writer found a young physician with his arm up to the elbow in a woman's abdomen; the patient lay unconscious on a kitchen table. As an explanation the physician stated that the woman was five months pregnant; she had had a hæmorrhage, which was interpreted to mean placenta prævia; he had attempted digital dilatation of the cervix, and version, but found his hand had perforated the vaginal vault and was in the peritoneal cavity; withdrawing it, he again attempted a dilatation of the cervix and was successful, but this time his hand passed through the uterine fundus and he again found it in the peritoneal cavity. Then, possessed with the not unreasonable idea that his patient must be bleeding dangerously from these two extensive ruptures, he pulled a pocket case from his pocket, opened the abdomen from ensiform to pubis, and through the incision grasped the bleeding uterus. It was necessary to tie the uterine and ovarian arteries and to pack the abdominal and vaginal wounds till the patient could be transported to the hospital. There a hysterectomy and closure of the abdominal wound with drainage was completed. Strangely enough, the patient died of pneumonia on the third day, and not of peritonitis. She had been taken to the hospital during a severe thunderstorm. As the uterine vessels of the broad ligaments were tied, there was a blinding flash of lightning and a deafening clap of thunder. The driver of a coupe in front of the house was knocked off his seat. In a conversation with the patient's husband a few months later, he said: "Just to think; if my poor wife had not been struck by lightning as you finished your operation, she might have been alive to-day." This was the explanation given by the attending physician.

These cases illustrate deplorable tendencies of the day: a superficial medical education; a subserviency to medical shibboleths such as "empty the womb for eclampsia," "dilate the cervix and do version for placenta prævia," and a hysterical obsession that something active and heroic must be done for all the different emergencies of practice.

The second proposition that the diagnosis is not always easy may be illustrated by these cases:

A woman was brought to the University Maternity by two physicians of many years' experience. One of them said that he suspected that the uterus was ruptured, because in his last examination he believed he felt the liver. The uterus was not only almost completely torn away from the cervix, but both the full-term, overgrown infant's arms had been pulled off, and two feet of the woman's intestines, stripped from the mesentery, were hanging out of the vulva.

In another case, a physician said to the writer that he had been in attendance on a parturient patient for two days; the head had been easily felt until twenty-four hours before, when it had suddenly become inaccessible. The woman had complained of no pain and her physician had noticed nothing alarming in her condition, but it was found in the consultation that the uterus had ruptured, the child had been expelled into the abdominal cavity, and the woman was moribund; in fact, she expired before the physician and consultant left the room.

A third case was in the writer's service in the Philadelphia Hospital. Nothing unusual was noticed about the patient's labor or puerperium, but when she got out of bed there were sudden gushes of water out of the vagina. It was found by the uterine sound and a chemical examination of the fluid that the posterior uterine wall had been ruptured and that the perforation communicated with an encysted ascites.

A fourth case came into the Howard Hospital a month after delivery, with what I thought was an intraperitoneal abscess in the region of the umbilicus. On opening the abdomen a localized abscess was found in this situation, but the cause of it was a rupture in the fundus uteri, from tube to tube, that had never been suspected.

Finally, it must be remembered that many a case of ruptured uterus may be saved by gauze packing of the pelvic and of the uterine cavity. To illustrate, the writer, in performing a version and a slow careful extraction of the fœtus for placenta prævia, ruptured the lower uterine segment, cervix and vaginal vault, which tore like so much wet paper. There was an orifice into the peritoneal cavity, into which the outspread hand could be passed. The pelvis was packed with gauze and so was the uterus. The uterine packing was removed in twenty-four hours, but the pelvic packing was left undisturbed for four days, when it was removed and replaced by fresh gauze. The patient made an uncomplicated recovery. It is interesting in this connection to recall the series of ten cases thus treated, recently reported from Germany, without a death.

On the contrary, if the rupture is anterior or lateral, if there is much intraperitoneal hæmorrhage, if the placenta or fœtus has escaped into the abdominal cavity, an abdominal section is required and most likely a hysterectomy. Moreover, the control of hæmorrhage and the evacuation of blood clots may be the most difficult part of the operation. In a case in the writer's out-

patient department, labor was obstructed by hydrocephalus. There was a breech presentation. The student in charge failed to recognize the obstruction. The uterus ruptured. A consultant rapidly extracted the after-coming head, probably increasing the laceration. When the patient was brought to the hospital, she was as near dead from hæmorrhage as anyone could be and recover. It was necessary to turn out the retroperitoneal blood clots as high as the kidney by incising the posterior parietal layer of the peritoneum, and it was only after a hysterectomy that the bleeding vessels could be secured.

Finally, if I might be permitted to offer advice to the general physician on this subject of ruptured uterus, it would run somewhat as follows: Cultivate the ability and the habit of making exact diagnoses of the comparative size of fœtus and maternal pelvis; estimate the degree of resistance to be overcome and the expulsive power available to overcome it; avoid hasty manual and instrumental interference and methods of extraction that must, from the nature and degree of the obstruction, prove futile; but do not delay the application of the appropriate method too long; bear in mind the symptoms of ruptured uterus and the fact that they may be far from distinctive in certain cases; be prepared to put into immediate effect the treatment apparently most suitable to the individual case, whether it be simply gauze drainage or a difficult, complicated major abdominal operation.

THE AFTER TREATMENT OF SUPRAPUBIC PROSTATECTOMY[1]

By G. KOLISCHER, M. D., Chicago

THE after treatment of this operation begins the moment the patient returns from the operating table to his bed. The special care of the field of operation will be considered first.

After the patient has been placed in bed, the distal end of the glass coupler is freed and connected with a long rubber tube. Then by means of a hand syringe the tube, the glass coupler and the bladder are filled with boric acid solution, and the end of the long tube is submerged into a few ounces of antiseptic fluid contained in a graduated glass jar which is placed on a level a few feet lower than the body of the patient; by the submerging of the free end of the filled tube a syphonage is established. As the frontal branch of the glass coupler is kept free of the dressings a permanent control over the drainage can be maintained; for instance, in the case of interference with the flow of the fluid by coagula or by air bubbles, the free flow will be restored easily by again injecting boric acid solution through the distal end of the tube into the bladder and then again submerging the free end of the rubber tube into the fluid of the receiving vessel. The graduation of this vessel permits the measuring of the secretion of urine in a given time by subtracting the original amount of fluid from the total amount of fluid collected. In order to prevent soiling of the bed and of the thighs and the perineum of the patient, the penis is either placed in a urinal or a rubber glove is tied over the glans penis. The abdominal dressings are to be removed once in 24 hours, and at that time the application of the silver nitrate paste is to be renewed. Especial care to force some of this paste between the tube resting in the bladder and the tissues surrounding it is to be taken, as the effects of this silver tend to counteract the deleterious effect of the urine that may result from its contact with the denuded tissues. The glass coupler is also detached from the tube draining the bladder, and the viscus is emptied by gentle manual pressure on the abdomen, after which two ounces of a 20 per cent argyrol solution are injected through the bladder tube into the viscus. After this the glass coupler is reinserted and the connection with the long tube and the syphonage is re-established in the way above described and a fresh dressing is applied. While the laboratory experiment proves argyrol to be of only moderate bactericidal power, its clinical efficacy cannot be denied. Any prevesical packing or drainage is removed 36 hours after the operation.

On the third day the glass coupler is definitely removed and the bladder is flushed out through its drainage tube with a 1:5000 silver solution until the fluid returns clear, in order to remove all blood or pus coagula; after the bladder is again emptied by gentle pressure on the abdomen a 20

[1] See "Technique of Suprapubic Prostatectomy," in the October, 1912, number of this journal.

per cent argyrol solution is injected. By a quick twisting motion the catgut suture fixing the tube in the bladder is now broken and the tube is removed. A longer retention of the tube would lead to pressure necrosis. After the removal of the tube silver nitrate paste is smeared into the fistula and the suture line is also covered with it. The abdominal skin is protected from the macerating effect of the urine by a thick coating of vaseline, which is renewed at each dressing. The whole field is covered with fluffed gauze and on top of that is placed an oakum pad; the dressing will be changed every time moisture has penetrated the padding.

As to the appliances devised for catching the urine flowing out of the suprapubic fistula, the Irving-Ferner cup apparatus cannot be employed in the early stages, because shortly after the operation the patients cannot stand the pressure of the cup on the suture line. It is useful later on in cases in which the fistula persists for several weeks. C. M. McKenna's double rubber apron can be applied in the early days following the operation without causing any discomfort, but as to keeping the patient dry it works satisfactorily only in rather fleshy individuals. With proper care the patients can be kept quite comfortable without any special apparatus.

Usually the patients begin to urinate about the seventh day after the operation; in case of its delay the passing of a few large calibred sounds will start the natural urination. It is helpful to instruct the patient to close the fistula by manual pressure during the attempt to pass urine through the penis. The healing of the fistula will be hastened by repeated cauterization with a silver nitrate stick. In case the granulations are particularly sluggish, dressings dipped in tinctura myrrhæ are to be applied. The application of scarlet red had better be avoided for two reasons: in old people the danger of anilin poisoning is always great, and secondly, the rapid epithelialization produced by this drug may also lead, as has been observed, to epithelialization of the canal leading down to the bladder, preventing closing of the abdominal fistula. In case of the occurrence of such an event for some reason or another, the sinus is to be thoroughly cauterized with a galvanocaustic burner. This procedure is preferable to freshening the walls of the fistula by curetting, as this is often followed by a profuse hæmorrhage. Sometimes, in spite of all precautions, infection of the suture line occurs; when exquisite tenderness, dark red coloring, considerable fever, and pronounced increase of leucocytes point to severe infection, the whole suture line has to be laid wide open in order to relieve the tension and to prevent sloughing of the fasciæ. This latter event is exceedingly serious, as it delays healing markedly and is almost invariably followed by a ventral hernia. Moist dressings are applied until the sensitiveness disappears, later on a 1 per cent silver salve with an addition of balsam of peru is applied. In case of pronounced kidney lesions the balsam is better dispensed with. The cleaning up and healing of such an infected wound is greatly furthered by the use of prolonged warm tub baths before each dressing.

In the case of a post-operative hæmorrhage of importance, it is first necessary to locate its origin to ascertain whether the bleeding takes place inside of the bladder or in the retrosymphysial space. In the latter case the lowest sutures are opened and the prevesical space tightly packed with gauze. If the hæmorrhage comes from the bladder a double compression has to be used. A colpeurynter is introduced into the rectum and is distended to its capacity by filling it with water from a hand syringe, while a heavy sandbag is placed on the abdomen over the bladder region; the knees of the patient are kept in flexion by pillows. To increase the coagulability of the blood 10 cc. of serum are injected hypodermically. Opening of the bladder for post-operative hæmorrhage and packing in order to check it, does not as a rule furnish very satisfactory results; firstly, the necessary manipulations often lead to severe infection, and secondly, the hæmorrhages very often recur after the removal of the packing.

The appearance of phosphatic concretions in urine after the first week signifies that the dissolving of the catgut on the inside of the bladder does not proceed satisfactorily, thereby producing a precipitation of urinary salts. This condition is treated by flushing the bladder daily with a 1:5000 salicylic acid solution. In rare cases it occurs that the granulations at the former site of the enucleated tumor persist even after the abdominal fistula has closed. This shows itself by occasional hæmaturia and by the appearance of phosphatic crumbs in the urine. A cystoscopic examination will ascertain the facts; in case these granulating areas lie close to the internal urethral orifice, they can be scraped off by introducing a slender uterine curette into the bladder and curetting them, while one or two fingers placed in the rectum control the movements of the instrument; this scraping is followed by flushing the bladder with an indifferent fluid and the instillation of a few drops of a 5 per cent silver solution into the again emptied bladder. In case that these granulations are located further back in the bladder, they have to

be curetted and cauterized through an operative cystoscope; either treatment soon succeeds in bringing about epithelialization of the granulating spots.

In the general after treatment the following points have to be observed: after the syphonage is established, the patient is put on the Wernitz drop-by-drop rectoclysis, as a matter of routine; as fluid a 3 per cent glucose solution is employed. This solution is absolutely innocuous to the kidneys and is of a very high nutritive value, with a selective action on the heart. This irrigation is continued for three hours, when a rectal tube is inserted for an hour, and on removal of this tube the rectoclysis is again started. This process in turn continues until the patient is able to take enough fluid per mouth to maintain a sufficient elimination. In case the amount and quality of the urine should show that in spite of all this the action of the kidneys is deficient, in addition to the rectoclysis diuretin is to be given internally or with the irrigation, six grains three times a day. On the second day after the operation the patient is made to sit up in bed and is taught breathing exercises twice a day. On the third day the patient is taken out of bed and put into an easy chair. On the fourth day, if there are no strict contraindications the patient begins to walk around.

If for some reasons the patient is unable to retain food on his stomach after the first 24 hours, a 3 three per cent glucose solution is injected hypodermically twice in 24 hours, 200 cc. at one time.

It is very important to secure for these old people a sufficient amount of sleep. Hence if the sleep does not come naturally it has to be forced by the administration of veronal or a similar drug. The use of morphin on account of its detrimental influence on the kidneys has to be restricted to absolute necessity. The heart action has also to be carefully watched, and in case of dilation digitalis or one of its derivates is to be administered. The seventh day after the operation is often of critical importance for the patient, as at this date in spite of good progress so far the kidneys will sometimes cease to act properly. As it is impossible at this period to measure the elimination by collecting the urine, the other signs must be particularly watched for. If the skin becomes dry, if the perspiration even after a bath is only scant and of a urinary smell, if the tongue is dry and the patient is drowsy, then the action of the kidneys have to be stimulated by all the means at our command; administration of diuretin, rectoclysis, hot packs over both the lumbar regions, and finally venesection if the pulse is of a very high tension. In case the patient should lapse and remain in a uræmic stupor, lumbar puncture has to be employed.

THE TREATMENT OF TUBERCULOUS JOINTS[1]

By JOHN L. PORTER, M. D., Chicago

I doubt if there is any surgical disease which has been the subject of so much controversy as to methods of treatment, or which has been subjected to such a wide diversity of methods in treatment, as tuberculosis of the joints. But it seems to me that each year brings a little more unanimity of opinion; that we find ourselves discarding more of the multitudinous suggestions of doubtful value and, better than all, we are treating each case individually and following the distinct indications in each case, instead of treating every case by a method of fixed routine for which we are unable to give a logical reason.

There are three facts to be borne in mind regarding joint tuberculosis: First, tuberculosis of the joint in a person of normally good resistance is naturally a self-limited disease; second, it always results in deformity and disability; third, the amount of deformity and disability depends upon the extent and duration of the disease. When I say that joint tuberculosis is naturally a self-limited disease, I mean that when the patient's resistance is not weakened by poor nourishment, poor hygiene, or poor heredity, most cases get well; but, left untreated, the joints will show some permanent deformity and disability when recovery takes place. And since the amount of deformity depends upon the extent and duration of the disease, it must depend very largely upon the efficiency of treatment and the promptness with which it is begun. Knowing these facts, the indications governing any method of treatment are: First, increase the patient's resistance in every possible way; second, put the

[1] Read before the Chicago Surgical Society, November 1, 1912.

joint into the best position for future usefulness when recovery has taken place; third, prevent the development of deformity so far as is possible. I say, "so far as is possible," because in some joints it is not always possible to prevent all deformity. I have never seen a case of mid-dorsal spondylitis recover without some degree of kyphosis, and rarely does a tubercular hip get well without some shortening and loss of motion. But, knowing these things, it behooves to see that the patient is spared as much of the distressing deformity as we can, and that he recovers with as good function in the joint as possible. Treatment of tuberculous joints is logically discussed under the following headings: First, mechanical; second, surgical; third, complications; fourth, medical and hygienic.

MECHANICAL TREATMENT

Without doubt, the most valuable procedure in the treatment of any tuberculous joint is rest and immobilization. In fact, if these things are efficiently carried out, most cases will recover in from three to five years with no other treatment except attention to the general health. It is the one thing upon which I have come to depend, and all other treatment is used simply as an adjunct to it. But right here I want to say that immobilization, to be of any value, must be efficient, and the reason it has failed in some hands and has seemed of doubtful benefit in many cases is because it has been inefficient. Remember that joint tuberculosis is a chronic disease. I have seen two or three cases, out of many hundreds, that I thought recovered in a year. More require three years, and most of them take from three to five years under the best of care. So bear in mind that when you put up a hip in plaster of Paris for two or three months, and then, because the pain and spasm have passed away, discontinue it, you have not used immobilization. Nor in case of Pott's disease, when you have sent to the instrument-maker for a spine brace, and allowed the patient to take it off at night, and finally throw it away when the straps wore out or the band broke, have you used immobilization. Nearly every physician seems to recognize the necessity of holding the joint still, because almost every case that comes to me late in the disease has at some time worn some immobilizing apparatus, but usually only for a short time. So frequently I hear it said, "I took the cast (or the brace) off because I was afraid the joint would get stiff." No well joint is made stiff by immobilization, and a tuberculous joint will surely get stiff if it is not immobilized. In other words, it is the disease, and not the immobilization, which causes the stiffness.

Immobilization, to be efficient, must be continued until the joint is well, and in cases of dorsal spondylitis I continue it long after I believe the tubercular process is cured.

While many cases of joint tuberculosis go on to marked deformity without much pain or spasm, a large percentage does suffer from both, and I know of no means of rapidly relieving the patient and overcoming the early deformity which is as efficient as traction in bed when properly applied. But everything depends upon the method of application. For the hip, the adhesive should extend from the upper third of the thigh to three inches below the foot, and there be attached to a spreader which is long enough to keep the adhesive from touching the malleoli. Then the adhesive is bandaged snugly to the leg, and the bandage sewed on inside and outside with a basting stitch to keep it in place. A cord is then attached to the center of the spreader and carried over a pulley at the foot of the bed, and from three to eight pounds weight attached to the cord, depending upon the patient's weight and comfort. The weight should never be great enough to cause pain, but just enough to tire out the contracted muscles, produce relaxation, and thus relieve the pain. If there is any flexion deformity, the leg should be elevated on an inclined plane, extending from the buttock to the foot of the bed, high enough to allow the lumbar spine to lie flat on the bed. When that is done, the pulley must, of course, be at the upper ends of the incline. After all is adjusted, lift the foot of the bed about six inches to prevent the patient slipping down. The same rules apply when traction is applied to the head for cervical or dorsal disease of the spine, except the inclined plane will not be necessary, and the head of the bed instead of the foot must be elevated. It is essential, too, in head traction, that the halter should be so adjusted that traction will be equal upon chin and occiput, or the patient will be uncomfortable. The patient should lie flat, without a pillow under the head, but with a thin narrow pillow made of a folded woolen blanket under the diseased vertebræ.

When the pain and spasm are relieved and the affected joint can be put into the proper position for permanent immobilization, the best fixation dressing for the first few months is plaster of paris. It is easily procured, and with a few precautions can be put on anywhere, by any physician, so as to be perfectly comfortable for the patient, and it can be made to immobilize any

joint more effectively than the best mechanical apparatus.

Plaster of paris should never be put upon the bare skin nor over absorbent cotton. The best protection is a garment of snug-fitting cotton underwear covered with a layer of sheet wadding, bandaged on firmly with a cotton roller bandage. For the hip, the cast should extend from the tenth rib to the toes; for the spine, it should extend from the sternoclavicular articulation to the trochanters. If the disease is above the eighth dorsal vertebra, the neck and chin must be included. These casts should be changed about once a month, to inspect the diseased joints and care for the skin. When all signs of progression of the disease have disappeared, and it seems evident that the process of repair has begun, it is safe to use some mechanical apparatus, though I believe that in the hands of one who is not skilled in the use of braces, the plaster of paris cast is safer throughout the entire course of the disease; for the simplest brace will get out of order, and the parents become careless in its adjustment, and unless a brace holds the joint firmly fixed all the time, it becomes a burden instead of a brace, and does more harm than good.

The simplest and most efficient spine brace is the old anteroposterior leverage brace designed by Dr. Fayette Taylor. It must be made from accurate tracings of the spine and pelvis made with the patient lying prone, and then must be carefully adjusted after it is finished, so that just the right amount of pressure is exerted on the transverse processes of the diseased vertebræ; as it must be remembered it is a leverage brace, and when it ceases to act as a lever it is useless. The so-called crutch braces, made with an upright fixed to the pelvis band, bearing crutches which lift up the patient's shoulders, are useless unless the spinal uprights act as levers, and are constructed on an erroneous idea. The shoulder girdle is so loosely attached to the thorax that any pressure exerted by these crutches in the axilla sufficient to take any of the weight from the diseased vertebra would be unbearable to the patient. For the same reason all plaster jackets should be trimmed out under the axilla to allow the arms to hang normally and move freely. It is hyperextension of the spine that is aimed at in all apparatus for Pott's disease, not to lift the superincumbent weight; for by hyperextension the weight is shifted from the bodies of the vertebræ to the articular and transverse processes, and the pressure on the affected vertebræ is thus relieved and with perfect comfort to the patient.

For the hip there are two braces that have given great satisfaction in my hands. One, the Judson long hip splint, is to be used with traction when the disease is progressive and when it is desired to let the patient walk without crutches. The other is the Thomas hip splint, which necessitates the use of crutches the same as a plaster cast. The first is useful when the patient can be seen at least twice a month, and where the parents can be made to thoroughly understand its principle and depended upon to keep it accurately adjusted. The second is useful to maintain a fair amount of fixation in cases which are beyond the progressive stage, or where the patient cannot afford the more expensive traction splint.

Bier's obstructive hyperæmia. My experience with the so-called Bier's treatment or passive hyperæmia has been disappointing; but I do not charge that to the inefficiency of the treatment, but rather to the inefficiency of the use of it. I have only used the rubber bandage for producing the hyperæmia, and have had no experience with the vacuum apparatus. Some cases may have gotten well sooner than they would without it, but the improvement is so slow that many patients get tired of applying the bandage two or three times a day for three or four hours and few are willing to come to the office daily for a protracted period to have it applied. Those who have used it most persistently and accurately claim good results.

SURGICAL TREATMENT

Regarding operative measures for tuberculous disease, I can do no better than to quote from Sir W. Watson Cheyne in the preface of his book: "In preparing a second edition of my book on 'Tuberculous Disease of Bones and Joints,' I have been much struck by the alteration which has been taking place in connection with the question of operative treatment. While there is very little to alter or add as regards the morbid anatomy and pathology of these diseases, there is no question that operative interference is very much less frequently employed at present than it was at the time when the first edition was published. When the tuberculous nature of these diseases was first demonstrated, the views as to the prognosis of tuberculosis were much more gloomy than they are at the present time; hence operation was very largely carried out with the view of attempting to eradicate the disease, as well as to obtain a good functional result. Since that time, however, experience has been accumulating, and has shown that, with careful hygienic and local treatment, the outlook of tuberculosis, especially

of the forms met with by the surgeon, is more favorable than was at that time thought, and the frequency of operations, especially at the early period of the disease and in the absence of suppuration, has been steadily diminishing."

The chief points to be considered in deciding whether to attack the diseased joint surgically are:

1. The age of the patient.
2. The local condition of the joint involved.
3. The general condition of the patient as regards his resistance, and evidence of toxæmia.

(*a*) Radical operations in children should be avoided, if possible, as it is certain to interfere with the later growth of the extremity, and the chances of recovery with good result under mechanical treatment and good hygiene are much better in children than in adults.

(*b*) In cases where there is extensive destruction, not only of joint structures but of bone, with probable sequestra and invasion of periarticular structures, operation looking to a general clearing out of the infected area by clean incision into healthy tissue is undoubtedly warranted, and especially if the patient is doing badly.

Then again certain joints are notoriously unfavorable for mechanical treatment in adults, as for instance, the tarsus. I think it is a safe statement to say that early amputation of the foot in disease of the adult ankle would be the most conservative treatment in 90 per cent of those cases, while in children the same joint shows remarkably good results under mechanical treatment.

(*c*) We are all familiar with those cases seen most frequently in young adult life, in which there is no resistance to the disease; the early toxæmia is marked and profound, and the patient steadily and rapidly grows worse. In such cases the only indication is to separate him from his infected focus as completely as possible, even to the extent of amputation, and then give him the benefit of outdoor treatment, tuberculin, and every other possible measure to save him.

Much might be said about special procedures for certain joints. Excision of the articular surfaces of the knee looking to early ankylosis has a strong advocate in Ely. Huntington would tunnel the trochanter and neck of the femur in all hip cases. But, while these may all be of value in certain selected cases, it is very doubtful if they are advisable as routine methods.

ANTISEPTIC INJECTIONS

For several years the injection of antiseptic solutions into the affected joint and the surrounding tissues was a favorite procedure of some surgeons. The antiseptic most frequently used was iodoform, suspended in glycerin or oil. Like others, I tried it in a long series of cases, and have discontinued it. I remember just one case, a knee-joint, where I thought it was helpful. I know that the idea has been very generally accepted that iodine has more curative or inhibitive effect in local tuberculous infections than any other drug, but, after fifteen years' experience, and having given it faithful trial in various forms, I have come to the conclusion that I want to be shown, for I have never seen any evidence of it myself.

Moreover, I do not believe it is a rational surgical procedure to inject an insoluble substance blindly into a tuberculous area, in the hope that it may hit a spot where it may do some good. Certainly if we stop to remember that in nine cases out of ten the primary focus of infection is in the bone, and not in the joint, and that, long before the joint becomes invaded and we get ready to inject, the disease has spread in various directions through the joint structures accompanied by granulation tissue,— if, I say, we carry that picture in our minds, we should certainly realize that a blind injection of iodoform or any other substance into the joint has about one chance in ten thousand of ever reaching the deep-seated foci which are causing the trouble. And unless we can reach them, what possible good can the injection do? There is just one class of cases in which I believe antiseptic injections may be useful, and I frequently use them, but I do not use iodoform. Those are the primary synovial cases, seen in young adults (twenty to forty years of age), and beginning as a subacute synovitis, with gradual swelling, little or no pain, and slight disability and limitation of motion. For such cases, if seen before the disease has penetrated the joint structures and invaded the bone, I inject a mixture of three per cent of formaldehyde solution in olive oil. Formerly I used glycerin instead of olive oil, but glycerin is so hygroscopic and irritating that I abandoned it for olive oil. My experience with this has not been sufficient to warrant definite conclusions, but it seems to me that some cases have improved more rapidly than others have without it.

COMPLICATIONS — ABSCESSES, SINUSES, AND SPINAL PARALYSIS

Tubercular abscesses. We have all of us been for so long imbued with the idea that all abscesses should be opened and drained as soon as fluctuation is detected, that we have failed to see that a so-called tubercular abscess is not an abscess at

all, and that the rule did not apply. We have been a long time learning that a patient with a simple tubercular infection, though he may have an abscess as large as his head, is more fortunate and has infinitely a better chance of recovery than a tuberculous patient with a mixed pyogenic infection added to his tuberculosis. We, who would never think of opening an uninfected knee-joint or cystic tumor except under the strictest asepsis, and have always closed such wounds immediately for fear of infection, have cheerfully opened sterile tubercular abscesses, stuck in drains, and condemned the patients to dress infected sinuses for months or years, and thought we did good surgery.

I have seen scores of patients with large abscesses, so-called, who had little or no temperature, gaining weight and doing well in every way; and after the abscess was opened and drained I have seen them lose weight, the temperature go up, appetite fail and the patient grow worse, and possibly die, from septic infection. And I have quit.

I believe there are just as positive indications for opening tuberculous abscesses as there are for any other aseptic operation, and that they should be opened only when those indications are present. While I have opened many such abscesses in the past eight years, I have never drained them, and my results have been so much better that I have simply wondered why I ever did it before.

Indications. When a tuberculous abscess is so situated or is so large as to interfere with mechanical treatment, it should be evacuated.

When it is burrowing so rapidly as to threaten the integrity of subcutaneous tissues to any considerable extent, it should be evacuated. When the patient has a persistent high temperature with indications of toxæmia, and is doing badly, if an abscess is present, it should be evacuated. If the abscess shows signs of probable rupture, it should be evacuated. If secondarily infected, open and drain, and only then.

Technique. I never attempt to evacuate such an abscess by aspiration or by puncturing with trocar and cannula, because both methods are irrational and inefficient. Anyone who has ever seen the contents of a tubercular abscess, containing cheesy masses of various sizes, flakes of coagulated fibrin, and often small bony sequestræ, must realize that such can never be evacuated through a trocar, and those are just what must be expelled to do any good.

I make an incision large enough to admit my finger, not at the most dependent site, but through healthy skin alongside instead of over the abscess. The contents are gently expelled and the cavity is gently washed out with normal salt solution, sterile water, or some mild antiseptic. When the water returns clear the fluid is all pressed out gently, and the edge of the wound is sponged with bichloride and tightly closed with deep sutures. Then a large compress is snugly bandaged on so as to keep the walls of the cavity in contact as much as possible, and the patient is kept in such a position as to prevent tension upon the line of incision until after it has healed. By this method we relieve the tension inside the abscess, allowing the walls of the cavity to collapse without infecting the cavity. I have become convinced that it is impossible to dress an open wound leading to such a cavity for more than a week without its becoming infected, even under the most ideal hospital conditions. Sometimes this method of evacuation disposes of the abscess permanently, but usually they fill up again. although not so full. They may have to be evacuated several times, each time becoming smaller, but it is far better for the patient to have it done a dozen times, as it can be done with local anæsthesia without pain, than to have it drained once and become infected.

Sinuses. What to do with old infected sinuses leading to tuberculous bone foci, often discharging for months or years, has long been a puzzle to the surgeon. Constant irrigation with antiseptic solutions certainly does no good, and I believe does harm. Curettage is worse than useless, as it simply exposes an increased area of raw surface to infection. Open incision is futile unless it reaches and removes the foci of infection. So for many years I simply let them run, keeping the skin clean and depending upon Providence and the patient's resistance to finally close them up; and if the patient lived long enough they usually did.

The introduction of bismuth paste a few years ago by Carl and Emil Beck promised a valuable adjunct in their treatment, and I believe it is in selected cases. But it has not proven the miracle worker that was originally claimed for it. I am convinced that its value is purely mechanical, and that a paste made with any insoluble inert powder will do exactly as well. A sinus is a collapsible tube, the cells lining it are macerating in the oozing moisture and being constantly washed away. The paste dilates the sinus, keeps its walls separated, and supports the newly formed cells until they are sufficiently organized to live, and perhaps stimulates by contact the activity of the indolent granulation tissue lining the sinus walls. Its use in sinuses leading to large cavities

is dangerous both from blocking up of the discharge and toxæmia, and from bismuth poisoning. Emil Beck has himself reported several cases of bismuth poisoning, and I have seen four, with two deaths; and in the light of such experience it seems little short of criminal to open up large tubercular abscesses and, after evacuation, fill them with bismuth paste, as has been recommended by some. It is in the old indolent sinuses, discharging a few drops of watery fluid a day and connecting with no definite cavity, that it seems to be most useful; and I am confining my use of it to such cases, and with much satisfaction.

When the interest in Wright's opsonic treatment was at its height, two years ago, I had quite a large series of cases given the treatment with tuberculin after Wright's method. It was done by expert laboratory workers, who were trained by a colleague who had spent some time with Wright in his laboratory, and the cases were nearly all patients in St. Luke's and Cook County hospitals, where they could be kept under constant observation. In a few cases the rate of improvement seemed more rapid than it would have been by mechanical and surgical measures alone; in the great majority of cases it apparently in no way influenced the progress of the disease, while a few cases seemed to be made worse rather than better.

Since abandoning the opsonic method of giving tuberculin, I have used it after the method suggested by Packard of Denver with more satisfaction. He advocates beginning with small doses, small enough to produce no reaction, and slowly increasing it in those cases which are neither doing well nor hopelessly badly, but those in which the patient has good resistance but needs a little assistance to tip the scale toward recovery. Even in such cases, the first sign of a reaction is an indication to stop entirely for a while.

Pott's paraplegia. Paresis or paralysis affecting the lower extremities — the so-called Pott's paraplegia — occurs in about 10 per cent of all cases of tuberculous spondylitis. It may occur early in the disease, especially when the mid-dorsal spine is affected, but as a rule it is a later complication. It is due to an extension of the disease backward into the spinal canal, and pressure upon the cord by the exudate and the pachymeningitis which results. It may present any degree of paralysis, from weakness and inability to control the legs to complete paraplegia, involving the bladder and bowels. Sometimes, especially in dorsal disease, the spastic contractions are so constant and severe as to be very distressing to the patient. If the patient is promptly put to bed, with traction on the head, as described above for the treatment of the pain and muscular spasm, and kept continually in bed long enough, the paralysis usually disappears. It requires from six to eighteen months usually, but I have never seen a case in which recovery from the paralysis has not occurred where the treatment was kept up for sufficient length of time.

I shall dismiss the X-ray treatment of tuberculous joints by saying that, personally, I have never seen any benefit from it, nor have I known anyone who has. During the early enthusiasm over the X-rays, many cases were reported of improvement and cure; but I tried it conscientiously in quite a number of cases without seeing any improvement, and gave it up.

BOOK REVIEWS

CHIRURGISCHE OPERATIONSLEHRE. Edited by August Bier, Heinrich Braun, and Hermann Kümmell. Leipzig: Johann Ambrosius Barth, 1912.

The appearance of any system of surgery under the editorship of Bier, Braun and Kümmell is of sufficient importance to attract more than passing mention. Anyone, however, who has an opportunity to examine it finds that the subject-matter far surpasses in importance and value what is ordinarily found in such books, and that it combines the good qualities found in the finest type of German text-books with the clearness and conciseness characteristic of the American surgical productions, and he realizes that this work now appearing marks an epoch in surgical book-making.

Volume II which is now appearing contains: Operations upon the Breasts, by Kuttner; General Technique of Abdominal Operations, by Bier; Surgery of the Stomach, by Bier; Surgery of the Intestines, by Schmieden; Operative Treatment of Appendicitis and Peritonitis, by Sprengel; Operations upon the Liver, Gall-Bladder, Pancreas and Spleen by Korte; and Hernia, by Sudeck. Each of these chapters is a real masterpiece, and the volume should be in the library of every surgeon who reads German.

Kuttner treats of his method of operating upon the carcinomatous breast with extension above the clavicle, and while he has not had particularly successful results, he has found that by following this up by X-ray treatment he is able to prolong the lives of his patients. Especially to be commended is his section which deals with the advances in surgery of the thorax, in which he discusses completely operations upon the lungs which have been made possible by the writer's investigations, and those of Sauerbruch, Meyer, Meltzer, Brauer, and others. The discussion of Fromme's operation is very complete, and he expresses himself as being well satisfied in general with the results.

Kuttner discusses, in addition to the above, the various operations upon the thorax, pleura, lungs, mediastinum, and œsophagus. Each of the 250 pages which he uses in this discussion is worthy of careful reading. They contain many new points and numerous suggestions upon the old ones.

The general technique of Bier is so well known in America that we read with much pleasure and profit the 200 pages in which he discusses the surgery of the stomach, with its relation to gastrostomy and operations upon the pylorus; and the extensive discussion of carcinoma of the stomach and the treatment of tuberculosis and syphilis.

Schmieden's chapter upon the operations on the intestines, while a complete résumé of the subject and thoroughly satisfactory from the reading standpoint, misses somewhat the personal equation which has made the other chapters of this volume so interesting and valuable.

Korte has been so long connected with the subject of gall-bladder that the student reads this chapter with special interest. In it are discussed operations upon the liver, tumors, cirrhosis, and the operative technique of gall-bladder surgery, as well as that of the spleen and retroperitoneal space. This discussion of Korte's is especially valuable because one feels that the observations and suggestions made by him are based upon sound pathology and long experience. It is slightly more abbreviated than the chapters by Kuttner and Bier, but still extremely valuable.

Sudeck's article is a complete résumé of the various types of hernias with a clear and concise description of the technique of their cure.

In general this volume of 850 pages is printed upon good paper, with beautiful clear type and illustrations much superior to the average which appear in German text-books on surgery; many are in two colors. One may feel certain that this system will stand for many years as the guide to the highest type of German surgery.

THE SURGERY OF ORAL DISEASES AND MALFORMATIONS; THEIR DIAGNOSIS AND TREATMENT. By George Van Ingen Brown, D. D. S., M. D., C. M. Philadelphia and New York: Lea & Febiger, 1912.

This work fills a place as a text-book and book of reference very much needed both by physicians and dentists. The author has had many years of experience as a teacher and practitioner and therefore is competent to show the relation of cause and effect between general diseases of the nervous system and other organs of the body and the oral cavity and vice versa. The author has entered into the details of many operations upon the mouth tissues, especially those of cleft palate and harelip.

The work as a whole, is by far the best and most comprehensive of any upon the subject and is recommended to the general practitioner and specialist alike.

The typography, printing and binding show the greatest skill and both the author and publishers are to be congratulated upon the production of such a valuable work.

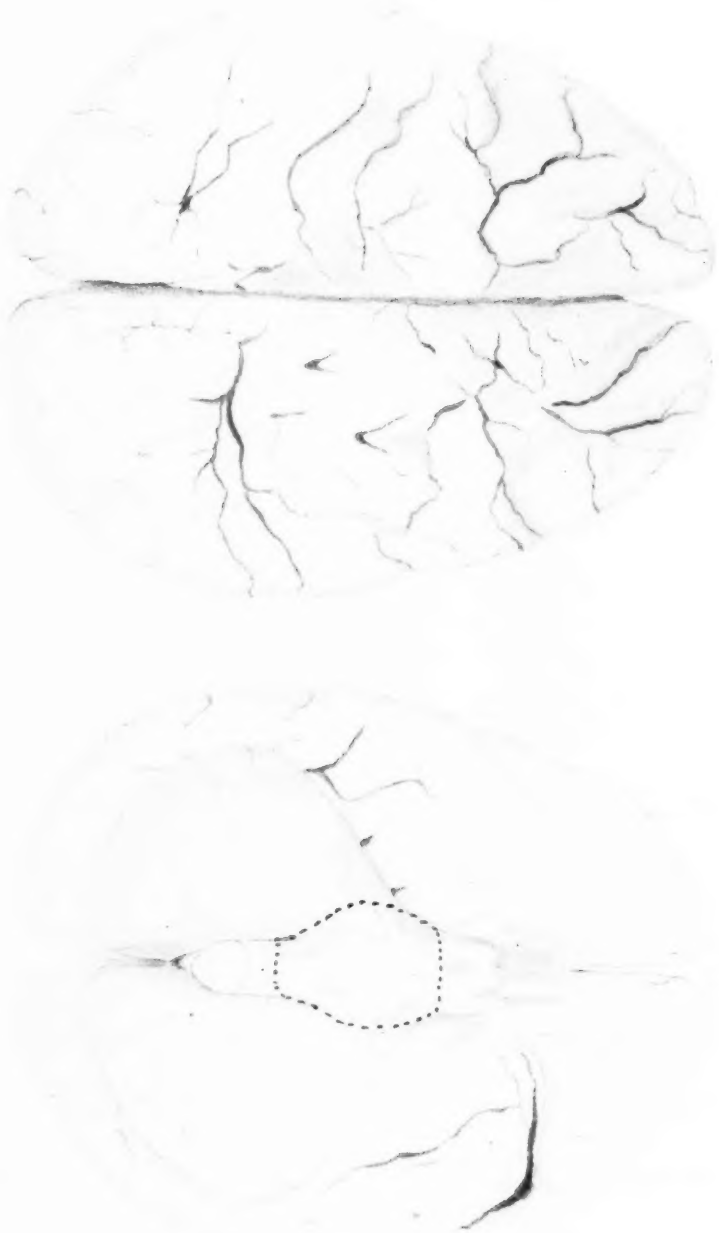

Plate II. Streptococcic meningitis. Drainage of the cisterna magna. Later autopsies would indicate that the area within the dotted lines is not influenced by this drainage. (Illustrating article on "Indications for and Results of Operative Treatment of Otitic Meningitis," by Ewing W. Day.)